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In Memoriam

WILLIAM ALEXANDER BAKER

January 17, 1931 – July 30, 1953

William Alexander Baker, elder son of Dr. and Mrs. Stanley Baker, Toronto, graduated from the University of Toronto Schools in 1949 and entered the class of 5T5 in the Faculty of Medicine.

In athletics Bill won distinction as an outstanding water polo player, participating in both intercollegiate and interfaculty sport. He also played lacrosse for two years. During his four years in "Daffydil" he played several unforgettable roles. Home Coming Weekends, "Panacea", class elections—he took part in them all. He was also an active member of Delta Upsilon Fraternity.

On July 30, 1953, following a brief illness, he died from poliomyelitis.

Bill will live forever in the memories of those who knew him as an enthusiastic classmate and a true friend.

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THE DIAGNOSTIC PROBLEM OF RHEUMATIC FEVER IN CHILDREN

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Rheumatic Fever still assumes major importance as a problem in prevention, diagnosis and therapy. Although there appears to be some decrease in incidence and though undoubtedly fewer rapidly fatal fulminating cases of the disease are seen nowadays, this is probably not related directly to any special advance in treatment. It has been suggested that the widespread use of antibiotics for upper respiratory infections in recent years has been responsible at least in part for this change. The trend toward lower incidence and less severe cases began long before the appearance of penicillin and thus one might suspect the change is rather part of the natural decline that has occurred in many other diseases in the past century.

Many agents, ranging from virus infection to vitamin C deficiency, have been incriminated as the cause of rheumatic fever. There seems general agreement now that the disease is precipitated by a Group A hemolytic streptococcal respiratory infection. In adults and older children this results in the sudden onset of sore throat, chills, fever, headache and tender cervical nodes. The throat is acutely inflamed and usually shows a marked exudative tonsillitis. In children, streptococcal disease presents a more diffuse picture and consequently mimics infections from other bacterial or viral agents. Even in older subjects almost one half of such infections produce few or no symptoms. After an interval of three days to three weeks following the streptococcal illness symptoms of rheumatic fever occur in about 5% of these patients.

The first attack of rheumatic fever commonly occurs between 5 and 10 years of age though it has been shown that this almost certainly does not follow the child's first experience with streptococcal infection (1). After puberty and in adults first attacks are less common.

The mode of onset of rheumatic fever is extremely variable. The classical attack consists of acute migratory polyarthritis, high fever, sweating and tachycardia. Signs of carditis may be present

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in addition. In other instances joint pains may be insignificant, the child may gradually fail in general health and the heart may bear the chief brunt of the illness. Chorea is sometimes a solitary manifestation of the rheumatic state, but may be accompanied by carditis. It never occurs at the same time as arthritis, which is indeed a fortunate arrangement. Children recovering from chorea may later develop further attacks of chorea or rheumatic fever.

Diagnosis

A useful guide to the correct diagnosis of cases of rheumatic fever has been devised by Jones (2). He has divided the clinical picture into major and minor components. With some modification this scheme will be used in the following discussion.

Major manifestations.

1. *Carditis.* Tachycardia alone is of no diagnostic significance and some cases of rheumatic fever may have bradycardia quite early in the disease. The development of a significant (over Grade 2 Levine)(3), mitral systolic murmur, or of a diastolic murmur either of mitral or aortic origin is evidence of active carditis. The systolic mitral murmur is typically blowing in character and radiates to the axilla. Occasionally it is high pitched, almost screaming in character early in the disease when it is termed a "seagull" murmur. The mitral mid-diastolic murmur, present in about one quarter of acute cases, may be missed unless use is made of a bell chest piece and the left reclining position. This murmur in children does not mean mitral stenosis and is commoner at the onset of the illness. with greatly enlarged hearts and previous cardiac damage. Proper positioning classically amplifies an aortic diastolic murmur but frequently in children it is better heard in the supine position. Further the peripheral circulatory signs do not appear early. A pericardial friction rub is good evidence of active carditis in the suspected case of rheumatic fever. The presence of heart failure during the course of rheumatic infection in children is serious and significant evidence of active disease. Liver enlargement, dyspnea and weight gain are early signs, while distension of neck veins and lung rales are late manifestations of this complication. A soft mitral first sound frequently allows prediction of a prolonged atrio-ventricular conduction time. While this is a very useful early sign of carditis it is unacceptable as a *major* criterion because a small number of normal children and children with inactive rheumatic heart disease show a PR interval in excess of 0.19 sec. (4). Transient lengthening of this value has been observed in a variety of bacterial infections as well. It should be remembered that in children the PR interval at heart rates over 110/min. is abnormally long if it exceeds 0.16 sec. Reference to tables for upper normal limits of the interval in the various age groups at any given rate, should always be made (5). Where other causes can be excluded, and when taken in conjunction with other findings, evidence of considerable cardiac enlargement by X-ray usually means active rheumatic carditis.

2. *Nodules.* Subcutaneous nodules may appear early or throughout the course of the disease. They usually emerge in crops over the occiput, knees, elbows, fingers, wrists, spine and iliac crests and are It usually persists longer in those patients frequently but not always tender. They

are important not so much in the diagnosis of the disease, though this may be true on occasions, but because they always mean activity of the rheumatic process. As the disease subsides so the nodules become less numerous and smaller in size. In some children they may persist for several weeks and then seem to melt away over the course of a few days but this is the exceptional finding.

3. *Erythema Marginatum.* This might well be termed the rheumatic fever rash for it occurs only in rheumatic subjects. It consists of a macular, irregularly or partially circular sharply defined erythema and is found over the trunk and limbs. Frequently missed on cursory examination, it tends to appear and disappear very abruptly. Although some observers feel that erythema marginatum may occur in the absence of active rheumatic disease it is more widely believed that patients who show recurrence of the rash ultimately develop severe cardiac damage. Other rashes are not uncommonly found during the course of rheumatic fever but these are usually papular or frankly urticarial in type and will be found to have occurred on previous occasions when the patient was free of rheumatic activity. The distinction is not purely an academic one, for the detection of erythema marginatum in a doubtful case of rheumatic fever settles the diagnosis immediately.

4. *Polyarthritis.* Pain and restriction of active movement or tenderness in at least two joints is necessary for diagnosis under this heading. All ranges of joint involvement are found in rheumatic fever varying from transient arthralgia to considerable swelling with effusion. Most often several larger joints are affected but occasionally the cervical spine and the small joints of the hands and feet are inflamed. Sometimes a single joint is attacked making the diagnosis difficult. Even more equivocal is the patient in whom no arthritis is evident but whose parents describe pain and tenderness in one or maybe two of the child's joints a few days previously. This particular picture is quite common and forms a very real problem in diagnosis.

5. *Chorea.* This disorder is diagnosed when a child shows widespread involuntary movements of muscles, muscular weakness and emotional upset. Most often the onset is gradual over a period of one to three weeks. Less often it starts quite suddenly. It may be preceded by tonsillitis but the exact etiology remains obscure. Chorea may be unilateral and very mild or generalized and severe enough to demand measures to protect the patient from injury. Most severe cases develop traumatic lesions of the skin from constant motion against the bedclothes. The characteristic wrist flexion and finger hyperextension seen in the outstretched arms of choreic children is a useful diagnostic sign. Their grip is well described as milking. While frequently a "pure" disease it may follow polyarthritis or accompany carditis.

MINOR MANIFESTATIONS

1. *Fever.* Some degree of fever is a usual feature of the disease for at least a few days. Naturally there is nothing specific about this manifestation. In smouldering forms of the disease low grade fever may persist for many months. Rarely remittent fever may be present and be so marked as to arouse suspicion of subacute bacterial endocarditis or abscess formation.

2. *Erythrocyte sedimentation rate*

(ESR). Elevation of the ESR above 15mm/hr., corrected, by the Wintrobe method is always present in active rheumatic fever or carditis. However in "pure" chorea and in severe carditis accompanied by heart failure the sedimentation rate is frequently normal. In a very few rheumatic patients with clinical evidence of active disease the ESR is found to be normal when measured by the Wintrobe method. Repetition of the test using the Westergren technique then reveals raised, sometimes excessively high values (6, 7).

3. *Electrocardiographic changes*. Apart from prolongation in the PR interval mentioned above, recent work has revived interest in the QT interval measuring electrical systole. When corrected for rate (QT_c) it is claimed that a lengthened value is good evidence of active carditis. Furthermore prognostic importance has been assigned delay in return to normal of this interval. Unfortunately measurement of the QT_c involves some error, normal standards differ with different workers and there may be lengthening from drugs, electrolytic changes, congestive failure and ventricular hypertrophy. Abnormal values may occur in cases with inactive rheumatic heart disease and normal values may occur in the presence of gross carditis so that at present the sign has little real value.

4. *Evidence of streptococcal infection*. The history of definite sore throat with fever followed by a latent interval before the onset of the rheumatic symptoms is a useful guide. Isolation of streptococci from the throat of the patient is not so commonly observed. Examination of the serum of suspected cases for the level of antistreptolysin has been advocated and values in excess of 200 units are said to be significant. In general this antibody response in acute rheumatic fever is higher than in uncomplicated streptococcal infections. The rise does not reach its peak until about two weeks after the onset of the rheumatic symptoms. For this reason, as well as some lack in specificity, the test is not of great value for the individual case in practice.

Another recently evolved test concerns the detection of C-reactive protein in the serum of patients with rheumatic fever. Serum from such cases always forms a precipitate in the presence of somatic C polysaccharide from pneumococci. The responsible protein is not normally present and disappears with recovery from the disease. While it may occur in a variety of conditions besides rheumatic fever ranging from malignant tumours to acute nephritis, it is absent in those suffering from appendicitis, rheumatoid arthritis, lupus erythematosus and periarteritis nodosa and thus may have some value when more generally available.

5. *Previous History*. Where there is good evidence of an attack of rheumatic fever or chorea in the past in a patient in whom the present findings are not alone diagnostic with any certainty, one is justified in using this history as one point in favour of a recurrence of the disease. Nosebleeds and abdominal pain occur in rheumatic fever but are not sufficiently specific to warrant inclusion as significant manifestations.

For diagnosis it is recommended that at least one major and two minor manifestations as outlined above be present. Two major manifestations are sufficient to permit a firm diagnosis without recourse to any minor features. Using this plan no serious attack of rheumatic infection is likely to escape notice. It is true however that the greatest diagnostic

problem exists in children with symptoms and signs only suggestive of a rheumatic origin.

Differential Diagnosis

It is convenient to discuss this problem under system headings.

HEART

In a known rheumatic child with previous cardiac involvement it is not infrequently difficult by clinical means alone to exclude subacute bacterial endocarditis. A spiking fever chart, enlarged spleen, cardiac murmur, pallor and microscopic haematuria may be present in either the latter condition or rheumatic fever recurrence. Rarely the diseases may coexist. The only certain means of differentiation is to take a dozen blood cultures from the patient over a 24 hour period and while awaiting results to give aspirin as a therapeutic trial.

Occasionally *congenital malformations* of the heart are mistaken for rheumatic heart disease. Recently a 6 year old girl who failed to gain weight following an attack of measles was diagnosed as rheumatic valvulitis and treated by bed rest, cortisone and aspirin for three months. Upon examination in a cardiac clinic the diagnosis was revised to that of patent ductus arteriosus and the condition was cured by surgical ligation within 2 weeks. More understandable is the confusion between mitral insufficiency and some cases of ventricular septal defect in childhood. Where the murmur of the septal defect is more widely transmitted than usual and not accompanied by a thrill the distinction is difficult in the absence of a clear cut history of rheumatic fever. Sometimes help may be obtained by the finding of systolic expansion of the left auricle at fluoroscopy in the rheumatic case but this sign is not frequently seen in the younger child and may be equivocal.

The number of children unnecessarily restricted in physical activity and suffering iatrogenic cardiac neurosis because of the incorrect interpretation of *innocent murmurs* is happily on the decrease. The functional systolic murmur, so common in children, is of low intensity (grade 1 or 2), vibratory or scratchy in quality and often mid-systolic in timing. It is usually encountered in the second left interspace or between the apex and the sternum.

Haemic murmurs accompanying the various common anaemias and even leukaemia have been mistaken for rheumatic valvular lesions. Simple blood smear and occasional bone marrow examination are sufficient to differentiate. The anaemia of rheumatic fever is an apparent one, the result of expanded plasma volume. This fact is responsible for the low hematocrit.

Pericardial friction is often indefinite or atypical for a day or two before the classical rub is detected. Rheumatic pericarditis has to be differentiated from acute benign pericarditis of childhood. The latter condition is never accompanied by significant heart murmurs and has an entirely different prognosis. By the time a friction rub is audible in uremia the underlying renal disorder is obvious.

LUNGS

Rheumatic pleuritis with pleural friction, immobilisation of the diaphragm, pain in the affected side and shoulder and sometimes effusion occurs alone rarely in children but may be mistaken for tuberculous pleurisy. A negative tuberculin skin test and the development

of other signs assist in diagnosis. A left pleural effusion of variable quantity on the other hand is an almost invariable accompaniment of rheumatic pericarditis with effusion. In such cases the signs of pericardial fluid overshadow the pleural features.

Rheumatic pneumonia is still the subject of debate as a specific entity and is probably much less common than an associated bacterial pneumonia. A practical difficulty arises in distinguishing rales in the lungs due to pneumonia from those due to cardiac failure in patients with recurrence of the disease.

MUSCULO-SKELETAL

Most errors made in respect of rheumatic arthritis occur when only a single joint appears to be involved. Of them all, mistaking *acute osteomyelitis* for rheumatic fever is by far the most serious. Treatment of osteomyelitis with aspirin for even 48 hours may mean the difference between chronic sepsis of bone and complete cure. A distinctive point is the *early*, localised, extreme bony tenderness near, rather than in the joint in osteomyelitis. Where there is any doubt at all it is much safer to treat the patient as if he had osteomyelitis. No rheumatic patient ever suffered real harm from bed rest and massive doses of penicillin.

In childhood rheumatic fever may involve the cervical spine and the small joints of the hands and feet. These patients may resemble those with *acute rheumatoid arthritis*. A simple method of distinguishing the two states is to administer aspirin in a dosage of one grain per pound of body weight. The arthritis of rheumatic fever unlike that of rheumatoid arthritis invariably responds dramatically to this drug.

Leukaemia with its signs of pallor, fever and haemic murmur may further confuse by causing limb pains of some severity. Less frequently frank joint swelling is present.

Anaphylactoid purpura can present with a history of streptococcal infection, arthritis and fever. The appearance of the characteristic rash differentiates. The problem of serum sickness presenting with arthritis and fever is solved by a careful history and the appearance of an urticarial eruption.

Acute suppurative arthritis allows no motion of the joint whatsoever and aspiration proves the diagnosis. Less spectacularly a swollen ankle or knee may be related to trauma in the playground, the full picture not being established until an elbow or shoulder becomes inflamed later. Gout, while extremely rare, has been reported in children.

"Growing pains" are worthy of special mention. Long a source of confusion in both medical and lay minds it is only recently that adequate study into their aetiology has been made (8). The incidence of joint pains of appreciable duration in school children has been found to be about 5%. The majority occur between 8 and 12 years of age, both girls and boys being affected. Pain during the day is the result of fatigue and postural defects in association with emotional disturbances, whereas nocturnal pain occurs in children with more stable emotional characters and a distinct family history of similar pains. Only rarely is there any organic disease responsible for the symptoms. One observer (9) feels there is a relationship between these pains and damp weather. In any case the term "growing pains" is a misnomer, for in this particular age span there is a relative slowing of growth.

NERVOUS

The most common error is to regard habit spasm as rheumatic chorea. Most children will produce the facial or limb tic upon request and patients with habit spasm never have dysarthria, difficulty feeding or other impairment of function. Organic diseases of the central nervous system such as post-encephalitic states or Friedreich's ataxia occasionally are confused with rheumatic chorea but a proper neurological examination always reveals the correct diagnosis.

RENAL

Microscopic haematuria and albuminuria are frequent transient findings in the early stages of rheumatic fever. The Addis count is practically always raised when routine urinalaysis is negative. Rarely frankly bloody urine is seen and such cases are best regarded as acute glomerulo-nephritis. Difficulty in diagnosis with these findings is seldom encountered except in those patients in rheumatic recurrence in whom subacute bacterial endocarditis is suspected.

ALIMENTARY

As abdominal pain is so frequent a finding early in acute rheumatic fever it is not surprising that some children undergo appendectomy at this stage of the illness. Indeed it is sometimes impossible to exclude appendicitis at a single examination so closely may the rheumatic symptoms mimic intra-abdominal inflammatory disease. A careful history, a warm ankle, a soft first heart sound in the mitral area or a small patch of erythema marginatum may be the clue required to avoid surgery. Again, a patient with arthritis following sore throat diagnosed as rheumatic fever may develop severe abdominal pain and on more careful examination prove to be suffering from anaphylactoid purpura.

FEVER

A great bulk of paediatric practice is concerned with the young child exhibiting low grade fever, anorexia, pallor and fatigue. Nowadays most mothers know that this combination of symptoms could mean rheumatic fever. Such children require a careful history and physical examination, blood count, urinalysis, sedimentation rate and tuberculin skin test. Recurrent upper respiratory infection is much more often responsible for this syndrome than rheumatic fever.

The so-called fever of unknown origin seldom proves to be rheumatic in origin. Some children record a temperature of 100 degrees F. orally without any significant symptoms and these cases are found to be perfectly normal otherwise. Nevertheless glandular fever, brucellosis and other infections have at times been confused with the rheumatic state.

CONCLUSION

It is a serious matter to make a diagnosis of rheumatic fever in childhood. Once the label is applied a rational plan for supervision of the patient must be formulated. Such a plan should include educational and vocational guidance and a vigorous insistence on adequate prophylactic therapy. Recently a committee of the American Heart Association (10) recommended that a daily dose of sulfadiazine should be taken by all individuals under the age of 18 years who have had rheumatic fever or chorea. There is little doubt now that this measure is of great value in the prevention of recurrences of the disease, but the responsibility for the doctor embarking on this long-term surveillance is a heavy one. In the unequivocal cases of rheumatic fever there is no problem over this point. In those where there is

some doubt and the criteria for diagnosis are not fully satisfied the decision is indeed difficult. While many of such cases are probably not rheumatic fever, some workers in this field feel that minor transitory attacks are misdiagnosed or even missed entirely. That a great number of cases of rheumatic heart disease in adults give no history of any acute rheumatic episode is in favour of this view. Recently, auricular biopsy during mitral commissurotomy in adults has revealed microscopic evidence of endocardial lesions resembling Aschoff bodies —long the classical histological proof of active rheumatic disease—to be present in at least 30% of cases (11). Whether this means that our ideas about the significance of the Aschoff body should be revised is not at all certain. The opposite view, that we need more sensitive criteria and laboratory aids than are at present available seems just as likely.

One of the many challenges in this crippling disease of the heart lies then in the earlier and more accurate detection of attacks of rheumatic fever producing scant symptomatology in children. The onus for such advance lies with public health as well as laboratory workers, and with doctors in general as well as in hospital practice.

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And I said of medicine, that this is an art which considers the constitution of the patient, and has principles of action and reasons in each case.—PLATO.

THE INFLUENCE OF THE SPECIALISTS ON THE MEDICAL PROFESSION

R. W. SHEPHERD, M.D.

"A bit of humour now and then
Is relished by the wisest men."

"If you live long enough with a dog you will come to resemble him."

This statement of fact is attributed by Dubois to a French physician of the 16th century noted for his great powers of observation, and for his dry and succenteriate manner of speech. On the other hand, Rodgkins in his "Annals of British Medicine" attributes the saying to none other than that great English physician, Rodgkins, whose classic work: "Dogs and the Medical Profession" laid the foundation for all future work in this field.

Whatever its historic source, the significance of this quotation is not to be gainsaid. The adaptive power of the human animal—like that of any other animal—is enormous, every individual striving to emulate the company he keeps, so much so that it seems not unreasonable to suggest that the saying is verified by fact.

Consider for example, the physiologists, that eminent group of men whose great and never ending research demands their consistent and intimate relationship with the experimental animal. On entering the department of physiology it is difficult, at times, to be certain of the origin of the barking sounds which fill the building.

On one occasion when looking for a friend in that department we were deterred from entering the room where he normally worked, since from the sounds it was obvious that the room had been converted into kennels. We found it to be quite to the contrary however, for on opening the door there was nothing more than a group of physiologists sitting around the table discussing, in their peculiar, high-pitched, pertussive manner of speech, one of the problems related to their field.

What is more, there are some students who claim they can spot a physiologist at a hundred yards in a crowd. The physiologist walks—as they point out—with a peculiar loping gait, stopping now and then to consider things, but with his soft brown eyes fixed always on the ground except when he raises his head periodically as if to sense the wind.

Having been present on one occasion when these students indulged their pastime, we were surprised at the accuracy of their judgment. Out of thirty estimates they were wrong on only three occasions. One of the subjects was a school teacher who had just lost his job, while another was not a physiologist but an unfortunate gentleman suffering an attack of acute renal colic and making

his way to the hospital. The third was a tree.

When considering these results later, the idea came to mind that if in some way we could tie off the duct from the pancreas, it might then be possible to isolate the tissue for later experimental work in the treatment of the disease.

When considering these results later, the idea came to mind that if the physiologist was influenced to such a marked degree by his proximity to the experimental animal, might it not be possible to postulate in a far wider sense that every specialist is influenced according to his own particular specialty?

It is popularly conceded, for example, that the optician, after a few years of practice, becomes very sensitive in his desire to be distinguished from the lesser of his brethren, the optometrists and ophthalmologists. This "guilt by association"—year after year—becomes so strong that the optician can be easily recognized by the sign which he carries on his back saying: "I have been properly trained." This is of course an extreme example, but it illustrates nonetheless how a specialty can shape the individual following it.

In the course of a year a group of 284 clinicians in the 40 to 65 age-group was studied. It was thought inadvisable to include the younger men in the survey, since any influence exerted by a speciality would of necessity be a gradual one.

Each clinician was carefully observed and described in some detail. Any peculiar mannerisms or tell-tale signs were noted—such as the characteristic contracture of the fourth and fifth digits in the gynaecologists, or the habit spasms of the neurologist—and when the study was considered adequate the diagnosis of the speciality was made.

The individual studies were then grouped together and classified into one of the main groups. The estimates were then checked by inquiring into the actual profession of the clinicians under study, and finally the margin of error was calculated.

Group One

In this large group the margin of error of 34% made the study almost invalid. These were the specialists in internal medicine, and the straight all-round surgeons. These could be anything, and in truth they very often were. We were most discouraged after studying a group of twenty-six of these to find that in error we had been observing a group of sanitary engineers holding a convention at that time in the basement of the new Best building.

The field of operation in general medicine and in surgery appears to be so broad—not only in relation to sex, but also to age and occupation—that the specialists in these fields are shaped by the infinite variety of their patients, rather than by one individual type.

Group Two

In the second group we have the hail-fellow-well-met-and-what-the-hell-seems-to-be-your-trouble type. This group of specialists is a happy group. More than happy, they are jovial and breezy, ready to meet any man on his own ground without regard for his past history. These men know the world in its actual state uncluttered by illusions and unhampered by false modesty. This is not to say that these men are insensitive, but rather that their distinctive field brings out in them the hearty approach to disease. They are inclined to be garrulous, and almost without exception they have an enormous fund of reminiscence which

breaks out on the slightest provocation and is quite likely to last halfway through the next lecture. These are simple men who would enjoy reading—if they read at all—literature along the lines of Chaucer or Boccaccio.

Diagnosis: G. U. Surgeons. Margin of error 7.5%.

Group Three

These clinicians are sensitive men. They suffer from tics and habit spasms. They blink their eyes almost continually, and the tremor in their hands is such that few of them are granted a driving license. To make up for the fact that they cannot drive on the roads they drive almost everywhere else, moving rapidly from one place to another, and suffering fools and medical students only with the greatest difficulty. They live at great pressure, both systolic and diastolic, but in spite of this they seem to live to a great age, which fact makes the subject they teach no clearer to those below them.

Diagnosis: Neurologists. Margin of error 9.0%.

NOTE: While studying this group an interesting fact came to light. It is extremely rare to see a neurologist on the street, or to see one entering or leaving a hospital. It has been suggested that the reason for this is that (a) the neurologists never go home. (b) That they have no home. (c) That they enter the hospital not by the foramen magnum, as it were, but by the pilodinal sinus next to the Hospital for Sick Children. (Not to be confused with the shute from that hospital which is reserved for other things.)

Group Four

In approaching the specialists in this group one must do so obliquely rather than directly, and one must leave by walking backwards while at the same time bowing. These are the Olympians, men all-powerful and omnipotent, all-knowing and omniscient. These are men of infinite authority which they dispense to their patients unsmiling and from a great height. (Not to be confused with other functions carried on from a great height, such as ballooning, flying, or high-diving.)

These specialists are busy, very busy and always busy, with the result that they drive the largest and the longest cars in the whole of the medical profession. There is nothing these men do not know, and what they don't know they blame on their colleagues.

Diagnosis: Pediatricians. Margin of error 2.4%.

Group Five

The clinicians in this group have soft palms. Moreover, they have a characteristic motion of their hands, rubbing their palms together while at the same time bowing, almost imperceptibility, from the waist. With few exceptions these clinicians are well dressed, impeccably groomed, sleek and clean shaven and with the barest hint of powder after shaving. These are dignified men, but of a dignity without severity; gentle, smooth-tongued, approachable, wealthy, deferential, mellifluous of speech and sycophant of manner.

Diagnosis: Obstetricians. Margin of error 0.8%.

Beyond these groups there are many of the fringe specialities. There are the radiologists who don't believe in the little green book. There are the dermatologists, furtive and sly from fear long-continued that someone will refer them

patients with skin troubles. And finally there are the psychiatrists.

The psychiatrists are grossly normal. In fact it would seem difficult to imagine a group of medical men more normal than the psychiatrists. Cast as they are upon the unchartered seas of the mind, and forced to navigate the Scylla and Charybdis of normal abnormality on the one side, and abnormal normality on the other, they must—in order to ensure no breakdown in the process of living—drop their anchor plum in the centre of the channel. This action ensures that they are absolutely normal, and since by their own definition no human being is normal, they attain thereby the infinite satisfaction of being like no other specialists in the whole of the medical profession.

This study into the influence of the specialities on the medical profession claims in no way to be complete. It is suggested only as a guide to medical students and junior internes who are on the point of setting out in the great adventure in the great profession. It is possible now to know what you will look like in the future according to the particular speciality you follow. The future, of course, remains to be seen.

To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is never to go to sea at all.—Osler.

LOW BACK PAIN

DONALD C. GRAHAM, M.D., F.R.C.P. (C)*

The problem of the patient with low back pain which so frequently besets the practising physician is often fraught with puzzling aspects, unsatisfactory therapeutic results and disgruntlement on the patient's behalf.

One reason at least for the complexity of this problem lies in the multiplicity of the possible causes of low back pain and the fact that in some cases, more than one cause may predispose to this disability in any individual case.

A rational approach to the investigation of those structures which are the site of the pain producing lesion may assist in the clarification of the majority of such obscure cases.

The table which accompanies this article demonstrates the complexity of the aetiological factors which require investigation in the case of obscure back pain.

Some general principles of investigation, a discussion of certain features of the differential diagnosis and a brief review of the measures of treatment applicable in the more common conditions causing low back pain will be presented in the following article.

General Principles in Diagnosis

It is probably unnecessary to stress that early diagnosis is a prerequisite to successful treatment. Investigation of the patient with low back pain should in all cases include a careful history, physical examination and adequate laboratory and X-ray studies. Much of the detail of history will be suggested by the following review of differential diagnosis. The exact mode of onset is important to ascertain as is the relationship of pain to activity and rest.

Physical examination requires adequate exposure and careful examination with the patient standing as well as in the prone and supine positions. The contours and alignment of the spine, the level of the pelvis, the presence or absence of muscle spasm, tenderness and wasting should be noted. Record should be made of the gait, stance and details of posture. The mobility of all segments of the spine in flexion, extension, rotation and lateral flexion as well as the range of rib movement with respiration should be tested. The range and effects of straight leg raising, mobility of the hips, shoulders and a general survey of all of the peripheral joints are important to assess.

Neurological examination, particularly of the lower limbs with investigation of muscle atrophy or weakness, sensory disturbances and tendon reflexes must be included in the survey. The location of tender areas and pain-producing activities should be noted. Investigation of the primary cancer sites in

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males and females of appropriate age groups, including rectal and pelvic examinations as indicated are of paramount importance in the investigation of back pain in such individuals.

The sedimentation rate is one of the most useful laboratory tests. Other laboratory investigations will be indicated by the features of the individual case. X-ray studies usually include antero-posterior and lateral views of the lumbar and sacral spine, an antero-posterior view of the pelvis to include the hips and at times a 35° antero-posterior cephalic tilt of the pelvis to show the sacro-iliac joints in greater detail. In some cases it may be desirable to have right and left oblique views to show the pedicles and apophyseal joints.

I. Traumatic and Postural Low Back Pain

Acute or chronic strain of the low back, occupational, recreational and frequently associated with faulty posture, muscular inefficiency, and obesity, is probably the commonest cause of backache. The human spine originally designed for optimum mechanical efficiency of a quadruped, has paid a heavy price for man's phylogenetic evolution to biped status, in which it operates at a decided disadvantage against the forces of gravity.

(*a*) *Acute Low Back Strain*—Even the fortunate individual with a structurally perfect musculo-skeletal apparatus will develop a backache if he engages too long and too violently in a form of activity to which he is unaccustomed. By adequate conditioning exercises to improve the development of the supporting structures of his back, he can attain a state in which he can engage in the same effort without subsequent pain. If the same individual undertakes violent effort in an off-balance position, or if another less well-equipped individual attempts even lighter effort, a frequent result is the tearing or giving way of one or more of the supporting structures of the back. The exact site of tissue damage may be difficult or impossible to define accurately. It may involve any of a large group of structures including the interspinous, supraspinous, ilio-lumbar, or posterior longitudinal ligaments, the apophyseal joint capsule, the lumbodorsal fascia, the sacrospinalis, quadratus lumborum, or gluteus maximus muscles, or there may be a periosteal tear of tendinous, fascial, or muscular attachments.

The lumbosacral mechanism is a site of great mobility in the low back, is subject to major and repeated stresses and in consequence its articular, muscular, and ligamentous structures are a frequent site of traumatic strain.

The sacro-iliac joints, on the other hand, are massively constructed, movement is comparatively slight at these articulations, and their supporting capsule and ligaments are sturdy, strong, and more able to withstand the effects of trauma. It follows that lumbo-sacral strain is therefore much more common than sacro-iliac strain.

The pain caused by such an acute traumatic episode results in a chain of physiological sequelae characterized by a variable degree of spasm of the supporting muscles of the back which in turn results in limitation of mobility of the back. If the spasm is sufficiently intense, it in turn may magnify the degree of pain. These sequelae to trauma initially constitute a protective reflex phenomenon but if they are unduly prolonged, they may produce a degree of

disability and distress out of proportion to their usefulness. In other words, the secondary or reflex effects may constitute the most disabling features of back strain, assume greater importance than the minor initiating trauma, and require energetic treatment directed against them.

The usual history of acute low back strain is one in which the patient experiences a sudden, severe low back pain while bending, lifting, or even on some insignificant trunk movement. This may be followed by immediate incapacitation or the patient may recover from the initial acute pain, for a day or so but subsequently develops a return of pain accompanied by spasm and immobility of the back. On examination he exhibits a list to one side with the erector spinae muscle on the convex or long side of the list, standing out as a rigid, hard cord unable to further contract or to relax. In this acute state of diffuse, generalized back pain and spasm, it is impossible to localize the initial site of injury.

Early treatment to relieve pain and spasm is of importance in breaking this vicious circle and consists in adequate bed rest on a fracture board, local heat in the form of an infra-red lamp, electric pad or continuous hot moist packs, and suitable analgesic drugs.

As the protective reflex phenomena of spasm and immobilization subside, one should then search for the underlying mechanical defect or defects which predisposed to this decompensation under stress. These defects include, for example, developmental anomalies, faulty posture, and obesity, and the correction of such faults constitutes an important problem in subsequent treatment. The patient will have to learn to avoid acts of physical exertion which exceed the bounds of his antigravity equipment and in certain cases this may even require a change in occupation.

(*b*) *Chronic Low Back Strain*—Once recovered from acute strain or at times following minor stress without such an acute phase and without the accompanying reflex phenomena of spasm and immobilization, residual low back soreness may persist for a variable or indefinite period of time. It has been suggested that this residual pain may be due to an inflammatory reaction about the traumatized site, ligament, muscle, fascia or tendinous attachment. Adequate rest and treatment as outlined for acute strain allows this reaction to subside if it is instituted early. Inadequate treatment and repeated trauma favour the development of recurrence or chronicity of low back pain. A weak spot, or "locus minoris resistentiae" develops in a previously asymptomatic low back. Previously present anomalies of the bones and joints, postural faults, and weak supporting trunk musculature which were heretofore adequate to meet the patient's needs must be further investigated and attempts made to correct and compensate for them.

(*c*) *Postural Low Back Pain*—Chronic low back pain without any recognized trauma, with few or no significant physical or X-ray findings, usually coming on toward the end of the day, or after the patient has been active or weight-bearing for several hours, and relieved by physical rest, constitutes a large and important group of cases of chronic low back pain.

There is normally a synergistic balance between the trunk muscles which effect the various movements of the spine (flexion, extension, lateral flexion and rotation) and it is this synergism

which allows the human body to operate with mechanical efficiency against the effects of gravity, weight carrying, and other acts of muscular force. Any imbalance in this synergism of trunk muscles *alone*, with no superadded trauma, no bony abnormality or joint disease can produce back pain due to muscle fatigue.

In such cases the patient presents certain characteristic postural faults. He stands with the head and neck protruding forward and the chin may be depressed toward the chest, the shoulders slump downward and forward, there is an exaggeration of the normal kyphotic curve of the dorsal spine and of the normal lordosis in the lumbar region. The chest may be flattened anteroposteriorly with apparent relative increase in its lateral diameter. The ribs are crowded together with increase in their downward curvature so that the lower ribs may closely approximate the iliac crests laterally. The sacrum is abnormally horizontal with increased acuteness of the lumbo-sacral angle. The patient may stand with slight flexion at the hips and knees and the feet of such individuals tend to be flat, pronated, and everted.

The essential treatment of such individuals with chronic low back pain due to faulty posture consists in a supervised programme of exercises designed to improve or correct these postural faults and to strengthen the supporting trunk muscles. These exercises and principles of proper posture should be practised constantly by such patients for a prolonged period, and in many cases for life.

At times the temporary use of a lumbosacral or lumbodorsal support may be employed as an adjunct to such treatment but the patient must be impressed that it is his own efforts, and not passive reliance on such a brace that will afford the maximum degree of lasting benefit.

Obesity is a common but not invariable finding in patients with postural back pain and weight reduction is an important therapeutic adjunct in such cases.

II. Herniated Intervertebral Discs

The intervertebral discs and their surrounding ligaments constitute the fulcral points of all movements of the spinal column in flexion, extension and rotation and as such the total stress and consequent wear and tear at such points throughout a lifetime is enormous. Irreversible damage to the supporting ligaments of the intervertebral discs may result from one or a combination of such factors as (a) inefficiency or loss of the supporting effects of the paravertebral musculature, (b) excessive physical stress, either of a chronic nature over a prolonged period of time, or more sudden, acute and violent stress particularly if imposed on a spine in a mechanically inefficient posture, or (c) developmental or inherent defects in the skeletal or ligamentous structures.

As the supporting structures undergo progressive injury the soft nucleus pulposus bulges through the weaker points under considerable hydraulic pressure. The anatomically weakest points of the ligamentous sheath lies at the lateral extremes of the canal in close proximity to the intervertebral foramina and their enclosed spinal nerve roots. As a rule the herniated disc compresses the nerve root as it approaches the intervertebral foramen producing the clinical sypmtoms and signs of nerve root irritation or compression.

Protective reflex mechanisms designed to decompress the involved root, result in the appearance of loss of lordosis, scoliosis, upward tilt of one side of the pelvis, intense spasm of the erector spinae muscles and marked limitation of all back movements.

The classical picture of intervertebral disc herniation is not difficult to recognize. The patient gives a history of trauma to the spine, often incurred during the process of lifting or supporting a heavy object with the back in a flexed posture. During or immediately after such trauma he experiences a sudden low back pain, sometimes accompanied by a snapping sensation in the affected area. The back pain may be associated immediately with sciatica but frequently the acute episode of back pain gradually subsides over a variable period of time but at a future date recurs together with sharp stabbing pain radiating down into one buttock and down the posterior or lateral aspect of the thigh and calf to the foot. This sciatic pain is aggravated severely by activities which result in increased intrathecal pressure such as coughing, sneezing or straining or by the application of bilateral jugular compression. These episodes of lumbosacral and sciatic pain may recover completely or partially only to recur subsequently.

On examination, the patient exhibits spasm and diffuse tenderness of the low back musculature with maximum localized tenderness on knuckle pressure over the interspinous space at the level of the affected disc. This latter pressure may even reproduce the sciatic pain. He exhibits the typical postural features described above with loss of the lumbar lordosis which appears flattened out, tilting of the pelvis upward on one side with the foot of that side slightly off the ground, and a dorso-lumbar scoliosis. There is marked limitation of all movements of the lumbar spine.

There may be evident atrophy of the buttock, thigh or calf on the affected side and this may be confirmed by measuring the circumference of the thigh and calf and comparing it with the circumference of the opposite limb at the same level. Straight leg-raising may be considerably restricted, particularly on the affected side but often to a lesser degree on the contralateral side as well. There may be weakness either of dorsiflexion or of plantar flexion of the great toe or of the foot as a whole. The acuity of appreciation of pin prick or even of light touch may be decreased over the dermatome of supply of the affected root. Decreased activity of the ankle reflex on the affected side and less commonly decrease in knee jerk activity may be evident.

The following generalties may occasionally be of assistance in cases suspected of having an intervertebral disc herniation.

1. Pain and sensory changes along the outer aspect of the dorsum of the foot suggest involvement of the first sacral root (L5-S1 Disc).
2. Pain and sensory changes in the great toe suggest involvement of the L5 root (L4-L5 Disc).
3. Radiation of pain across the midline of the anterior thigh toward the medial aspect of the thigh suggests involvement above the L4 level and may require further studies by means of a myelogram.
4. Local muscle weakness is of little localizing value in lumbosacral root lesions where sensory changes are more specific. This is the op-

posite of the situation in the case of cervical root lesions.

5. Depression of the ankle reflex is compatible with a lesion of either the L4-L5 or the L5-S1 disc. Depression of the knee jerk is suggestive of a lesion at a higher level.
6. Pain in the lower limb contralateral root by a large disc herniation but may be due to a lesion at another level and may require myelographic study.

Unfortunately many cases of intervertebral disc herniation do not present such a typical history and clinical picture. Often there may be no history of any specific trauma and the symptoms of back and sciatic pain may develop gradually and insidiously.

The localization of pain may at times be atypical. It may remain confined to the lumbosacral region of the back or may only radiate to one buttock. Deep boring pain in the buttock without typical sciatic radiation is not an unusual presenting symptom. In unusual cases where motor elements suffer most, a gradual paresis with few or no sensory changes and little or no pain may occur. At the other extreme there may be severe pain and no motor signs. At times straight leg raising may be grossly limited without appreciable pain leading to a suspicion that the condition has a functional basis.

Midline disc herniations may produce a slow general cauda equina compression leading to severe muscular fatigue with gradually developing subsequent focal motor weakness. Midline disc protrusions following sudden severe trauma may simulate cauda equina section or tumor with paraplegia and loss of bowel and/or bladder function.

Treatment

The proper treatment of the herniated intervertebral disc is often difficult to formulate and it is not possible to generalize on this matter. Treatment must be individualized to meet the requirements of each separate case.

Many patients with a single attack or with few attacks may be amenable to non-surgical treatment and it is well recognized that the results of surgery on unselected or poorly selected cases are by no means uniformly favorable. It is probably fair to state that practically every patient during his first attack, and most patients who show no localizing objective neurological changes should be given a thorough trial of conservative measures. These include an adequate period of complete bed rest on a fracture board which in some cases may require as long as 4 to 6 weeks. In addition, other measures designed to lessen the secondary or reflex phenomena of muscle spasm are applied in the form of local heat, and adequate analgesics for relief of pain. In some centers certain drugs with the pharmacologic propensity to induce muscle relaxation, such as curare and myanesin (tolserol) are also used with some enthusiasm but their value in such cases has not been uniformly accepted.

After the acute phase of pain and spasm has subsided a graded physical rehabilitation programme is of considerable importance. This programme is designed to teach the patient to use his musculo-skeletal apparatus with the utmost mechanical efficiency and embraces intensive postural training. In addition it aims at developing and strengthening the muscular envelope of the spine to increase the supporting function of that structure. Lumbosacral

braces are viewed with varied degrees of enthusiasm by different authorities but if they are used their role should be confined to that of an adjunct only to the programme of physical rehabilitation discussed above and should not be considered a substitute for such measures.

If the patient remains seriously disabled or experiences recurring attacks despite a conscientious and thorough trial on such conservative measures, or if he evidences progressive impairment of nerve root function in the form of increasing motor weakness or wasting, it will likely be necessary in most cases to resort to surgical intervention. The technique of surgical measures is beyond the scope of this discussion.

The necessity for, and the value of myelographic studies is a matter of some controversy. It is probably fair to state that if surgical treatment is considered necessary, it is wise to perform such studies in view of the fact that they may assist the surgeon in his technical approach and also because disc herniations are not infrequently multiple. In addition, it must be borne in mind that other lesions such as a cauda equina tumor, may on occasions produce monoradicular symptoms and signs which may simulate the picture of an intervertebral disc herniation and myelographic studies may afford valuable diagnostic information in such cases.

III. Congenital Anomalies and Mechanical Instability

The most common anomalies of development in the lower spine are spondylolysis, spondylolisthesis and complete and incomplete sacralization of the last lumbar segment or lumbarization of the first piece of the sacrum. These are diagnosed by X-ray.

In many instances such developmental anomalies are discovered in X-rays taken for other reasons and are not associated with any back discomfort. Therefore one must be careful in assessing their significance in cases of low back pain. Their mere discovery does not necessarily imply that they are the cause of the pain and probably in the great majority of cases they are not. One must be careful to search for other causes of pain in individuals with such anomalies, by complete physical, X-ray and laboratory studies.

It is likely, however, that such developmental anomalies do contribute in some degree to mechanical instability in the low back and render it the more susceptible to the effects of minor or repeated physical stress, faulty posture and obesity. In other words, patients with such developmental anomalies should be thoroughly investigated by physical, radiological and laboratory examinations just as would any other patient with back pain who has no such congenital anomaly.

IV. Degenerative Joint Disease (Osteoarthritis) of the Spine

Degenerative joint disease is a condition common to individuals beyond the middle years of life, generally considered to reflect normal physiological wear and tear particularly of such weight-bearing joints as those of the spine, and accentuated by obesity, occupational strain, injury and faulty body mechanics. X-ray evidences of osteohypertrophic lipping and spurring of vertebral margins is an extremely common finding in individuals over 45 or 50 years of age but in the great majority of individuals is associated with no back pain.

Patients in this age group are subject to back pain of other aetiology, to acute and

chronic traumatic strain, postural backache, intervertebral disc lesions and to other more serious causes of back pain such as neoplastic involvement of the spine. It is therefore imperative that the investigation of the older individual with back pain be carried out carefully and thoroughly before one finally concludes that his disability is due to osteoarthritis of the spine.

There is no consistent correlation between the degree of the patient's disability and the extent of the X-ray findings. In cases of back pain due to osteoarthritis, the clinical picture is more important than the X-ray.

When back pain is due to degenerative disease of the spine, the patient usually experiences aching and stiffness worse after sitting or lying down for any length of time, improving with moderate "limbering-up" activity, but worse again after more strenuous physical exertion. These symptoms are subject to exacerbations and remissions. Root pains are not infrequent in these patients.

Treatment consists in general measures designed to correct or alleviate those conditions which add to mechanical stresses on the spine and accelerate degenerative processes. Weight bearing should be reduced to a minimum and insofar as possible the patient should avoid any strenuous physical activity especially those requiring stooping or heavy lifting. Frequent rest periods, even for a few minutes at a time are advisable. Obesity should be corrected by necessary weight reduction. Exposure to cold and dampness frequently aggravate the distress and in such cases should be avoided as much as possible. In the majority of cases intensive training in the principles of proper posture are indicated and these patients should train themselves to become "posture-conscious" in their every activity.

In some cases a light spinal support of corset type assists in postural correction but the patient must be impressed with the fact that his own conscientious and persistent efforts are of infinitely more value than passive reliance on spinal support.

As in cases of postural back pain and chronic mechanical strain, a series of graded exercises designed to improve the supporting function of the muscular envelope of the spine, are indicated.

The use of a fracture board between the mattress and bed springs should be permanently adopted. Symptomatic relief may be provided by suitable forms of surface heat and by the free use of non-habit forming analgesic drugs.

V. Marie-Strumpell Spondylitis

Marie-Strümpell Spondylitis may develop at any age but most commonly begins between the ages of 18 and 35 years. In many ways closely related to rheumatoid arthritis, it differs notably from that disease in that it affects the male in approximately 90% of cases. It begins as a synovitis of the sacro-iliac joints, later progressing to pannus formation, destruction of articular cartilage, sclerosis and irregular erosion of subchondral bone and finally fibrous or bony ankylosis. Later there is irregular involvement of the intervertebral apophyseal joints progressing proximally up the spine to variable levels, sometimes extending into the cervical segment. Calcification or ossification later develops in the paravertebral ligaments producing the X-ray appearance of the bamboo spine in advanced cases. Involvement of the costo-vertebral joints with consequent decrease in rib move-

ment with respiration and marked immobilization of the chest is common.

Usually the disease develops gradually and insidiously but the onset may be more acute and severe with marked disability, mild to moderate fever, leukocytosis and elevated sedimentation rate. With acute inflammatory involvement of the apophyseal joints and adjacent tissues, nerve root irritation may occur with the production of constricting "girdle pains" about the chest or abdomen. Pain of sciatic distribution is also common in this disease. In from 20 to 30% of cases one or more of the peripheral joints may, at some time during the course of the disease, present an acute arthritis essentially similar to rheumatoid arthritis clinically, pathologically and radiologically.

As a rule the disease begins with mild recurring episodes of pain diffusely through the low back, accompanied by stiffness, and as the disease progresses, increasing limitation in mobility of the spine. The symptoms and signs as a rule develop first in the low back and spread proximally. Constitutional symptoms of weight-loss, fatigue and mild to moderate secondary anaemia are common.

The sedimentation rate is usually elevated but it is important to bear in mind that about 20% of cases of this disease show no significant elevation of sedimentation rate and such a finding by no means rules out the diagnosis of Marie-Strümpell Spondylitis. In conjunction with careful physical examination of the entire spine, thorax and peripheral joints, X-ray studies are of considerable importance in the diagnosis of this disease, with particular reference to the X-ray appearance of the sacro-iliac joints.

VI. Myositis or Fibrositis (Lumbago)

This condition is characterized by aching pain and stiffness aggravated by inactivity and relieved by mild "limbering up" activity but tending to recur after more strenuous physical exertion. It is often worse during cold and damp weather or preceding weather changes. It is relieved temporarily by heat, massage and aspirin and by general stretching exercises. In the more acute phases it is characterized by tenderness of the paravertebral muscles and soft tissues, often accompanied by spasm and limitation of back movements. In less acute cases, even these findings may be absent. The X-ray and laboratory studies reveal no significant abnormality.

This condition has in the past been considered to be due to a diffuse non-suppurative inflammation involving muscles, fascia and connective tissue in general throughout the affected area. However, muscle and connective tissue biopsy sections in such cases have failed to confirm the existence of any inflammatory reaction or any other consistent histopathological findings.

It is highly probable that the majority of cases of so-called "fibrositis" more properly fall in the group of postural back strain with obesity and faulty posture as important causative factors.

Many individuals with such "fibrositic" pain exhibit manifestations of persistent emotional tension and inability to relax either emotionally or physically. It is probable that intractable emotional tension may become reflected in time, in actual somatic muscle tension which eventually results in muscle aching and stiffness.

Treatment consists in reassurance concerning the absence of any serious or

crippling disease and explanation concerning the nature of the symptoms. Suitable sedatives are prescribed if emotional tension appears to be a factor and postural faults and obesity are treated as described previously. Local heat, massage, general stretching exercises and aspirin or APC's are employed for symptomatic relief.

VII. Tumours of the Spine

The most common benign tumors of the spine are hemangiomas and giant-cell tumors. Of the primary malignant neoplasms of the spine, multiple myeloma occurs most frequently. It is important to bear in mind that this type of tumor may be manifested radiologically by a diffuse uniform osteoporosis as well as by the more widely recognized classical "punched-out" osteolytic lesions. Metastatic carcinoma is by far the commonest secondary neoplasm of the spine, the usual primary sites being the breast, prostate, lung, thyroid, kidney and gastrointestinal tract.

X-ray studies are of major importance in the diagnosis of spinal neoplasms. Nevertheless, it is imperative to continually bear in mind the fact that extensive neoplastic involvement of the vertebrae may occur before any radiological abnormality becomes evident. Therefore if the clinical history and physical findings strongly favor a diagnosis of neolpastic involvement of the spine, a negative X-ray by no means rules out such a diagnosis. This statement is particularly true in the case of secondary carcinoma. Complete physical, laboratory and radiological studies are required in all cases where spinal tumor is suspected. Needless to say this includes rectal, and in the case of females, pelvic examination.

Certain laboratory tests are of sufficient importance to merit special mention. When multiple myeloma exists, the sternal marrow reveals an abnormal number of plasma cells or myeloma cells, serum protein estimations frequently reveal abnormally increased globulin fractions and the urine may contain Bence-Jones protein in some cases. Studies of phosphatase activity of the serum, particularly of the acid phosphatase activity are at times of assistance in establishing the diagnosis of secondary prostatic carcinoma in the spine.

VIII. Osteoporosis

The diagnosis of osteoporosis is established by X-ray studies. One must bear in mind that the apparent density of skeletal structures varies with film technique, with the amount of overlying soft tissue and with the individual interpretation of the person reading the film. Osteoporosis is considered to result from the failure of osteoblasts to deposit bone matrix or osteoid tissue in required amounts. It is *not* due to inadequate deposition of calcium in bony matrix (osteomalacia or rickets), or to excessive removal of calcium from the skeleton by osteoclasts (osteitis fibrosa diffusa of hyperparathyroidism).

The formation of osteoid matrix depends upon:

1. Steroid hormones
2. Mechanical stresses and strains
3. Adequate nitrogenous building blocks for manufacture of protein matrix

The most common type of osteoporosis is the senile type which is considered secondary to falling off in the production of the steroid (gonadal and adrenal androgenic) hormones with advancing years.

Post menopausal osteoporosis is considered to be due to the reduction in

THE MORE COMMON CAUSES OF LOW BACK PAIN

Mechanical Disturbances	Congenital Anomalies of Spine (Pre-Disposing Factors only)	"Rheumatism" and Arthritis	Neoplasms	Metabolic and Endocrine Disturbances	Infections	Neurological Disorders	Referred Pain	Misc.
I. *Traumatic and Postural* A. *Acute* and B. *Chronic Strain* incl. Lumbosacral and Sacroiliac strain C. *Postural* Faulty posture Muscular Instability and Inefficiency Inequality in leg length Obesity D. *Fractures* of pelvis, coccyx, sacrum or vertebrae (body, pedicles or transverse processes) II. *Herniation of Intervertebral Discs*	Spondylolysis Spondylolisthesis Lumbarization of 1st sacral seg. or sacralization of last Lumbar segment (Complete or incomplete) Spina Bifida Additional Lumbar Vertebrae Anomalies of devel't, size and configuration of facets particularly lumbosacral facets. Changes in size and shape of transverse processes of 5th lumbar vertebra	Degenerative Disease (Osteoarthritis) of spine Marie-Strumpell spondylitis Myositis or Fibrositis (Lumbago)	I. *Primary Neoplasms of Spine* Giant cell tumor. Hemangioma Osteoma Osteochondroma Ewing's tumor Osteogenic sarcoma Multiple myeloma II. *Metastatic Neoplasms* From primary carcinoma of Breast Prostate Lung Thyroid Kidney G.I. tract Cervix Lymphoblastomas	*Osteoporosis* senile and post-menopausal with or without pathological fracture Osteomalacia Rickets Hyperparathyroidism	I. *of Vertebrae* T.B. Osteomyelitis Brucellosis Syphilis-(including Charcot spine) Typhoid II. *Affecting Muscles* (*a*) General infections *with* actual involvement of back muscles e.g. Trichinosis Typhoid Fever (*b*) Gen. infec. *without* actual involvement of back muscles Influenza Pneumonia Acute Exanthemata Brucellosis, etc.	Herpes Zoster Meningitis Arachnoiditis Poliomyelitis Tumors of cord, Meninges, cauda equina, Lumbar or sacral nerve roots Psychoneuroses Malingering	From lesions of Genital organs, Urinary tract, or G–I tract	Paget's Disease

estrogen production and usually becomes manifest 8 to 15 years after the menopause. A third type of osteoporosis occurs in Cushing's Syndrome due to excessive production of the anti-anabolic "sugar-active" hormone or hormones of the adrenal cortex.

The most important stimulus to the laying down of osteoid tissue by osteoblasts is the stress and strain of weight-bearing and activity. Osteoblastic activity decreases when the part is immobilized for prolonged periods as during long periods of bed rest due to chronic illness, immobilization in plaster casts or in association with extensive muscle paralysis.

Conditions such as pregnancy, malnutrition and nephrosis associated with inadequate protein building blocks may result in osteoporosis if the protein depletion is sufficiently severe or prolonged.

Osteoporosis of any of these types may be associated with chronic persistent back pain in the absence of any deformity or compression fracture of the spine. In other cases, the patient may be aware of a sudden snap or crack in the back while lifting, stooping or during a minor twisting strain or fall. This episode may be followed by severe persistent back pain and X-ray examination will reveal a compression fracture of one or more of the osteoporotic vertebrae. In all cases of osteoporosis it is important to clarify the underlying condition responsible for the disorder and to investigate the possibility of multiple myeloma, secondary neoplasm and hyperparathyroidism.

Treatment of osteoporosis of the senile and postmenopausal tpyes is, as a rule far from satisfactory. On theoretical grounds it would appear sound to administer estrogenic hormones to these patients and in some cases such therapy is associated with considerable relief of pain even though there may be no radiological evidence of increase in bone density. Some feel that an added protein, calcium and phorphorus retaining effect is provided by combining testosterone with estrogenic therapy. These hormones should not be administered continuously but should be given for a month or two at a time followed by a week or two without hormone administration. The diet should contain at least a gram of calcium daily and be high in protein content. It should include at least a quart of milk daily along with other dairy products, eggs and meat, fowl, and fish in considerable quantity.

In order to ensure an adequate supply of building blocks for osteogenesis, it might be of value to add a calcium supplement and extra vitamin D, not in excess of 25,000 International units daily. In addition, these patients should adopt the use of a fracture board and may also obtain some relief from the use of a light dorso-lumbar support of corset type. Local heat to the back and graded exercises to improve the supporting function of the back muscles should also be employed.

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EDITORIAL

SUCCESS OR FAILURE?

Once again the JOURNAL staff has assembled and a new year is underway. It is our hope that we can maintain the high standards set for us by our predecessors and it is with the co-operation of you, the students in the Faculty of Medicine that we will be able to do so.

To you who are returning to the campus, little need be said about the JOURNAL—you will already have formed your opinion of its worth. To you who are beginning life here at this University, some introduction to the JOURNAL is perhaps needed. It is our aim to present articles of interest to all years—to be sure, many will be of immediate interest only to the clinical years but we hope that everyone will find something of interest in each issue.

You will find that many of the articles presented here are written by members of the staff. Frequently, these are on topics suggested by the students. Your suggestions, therefore, are most important—do not hesitate to let us have them. Since this is a *student* publication, our desire is to present student articles. Do not feel that your knowledge is so limited that you cannot write an article. The mere fact that you have tried will increase your understanding of the subject. You will also find that the experience you have gained in assembling and presenting the material will be of great value to you in later years. This JOURNAL is *your* JOURNAL—its success or failure is up to you!

OBSTETRICAL DYSTOCIA DUE TO THE FETUS

R. BLADEK, M.D.

Introduction

The purpose of this paper is to review the dystocia or difficult labour attributed to the abnormalities in size, shape and other pathological variations of the fetus and its membranes.

Dystocia due to abnormal presentation of normal fetus is excluded from this discussion.

In reviewing the literature on this subject I have come to the following impressions:

(1) Dystocia due to the pathological variations of the fetus is very rare.

(2) The literature dealing with this subject can be divided into three stages:
   (a) Prior to this century—detailed anatomical and narrative description of abnormal fetus.
   (b) First two decades of this century —at that time, intensive research and interest in pathology of the fetus and its effect on labour resulted in the appearance of most of the classical works.
   (c) Recent decades—emphasis on diagnosis of dystocia and its treatment.

(3) In spite of all the research in the etiology of congenital abnormalities, very little has been achieved in its prevention.

(4) The introduction of new diagnostic methods, notably of X-rays, has resulted in better recognition of abnormal fetus prior to the delivery.

(5) With the general advances in obstetrics, especially the widespread use of Caesarian section, the outlook for the mother in cases of dystocia has been improved.

(6) The obstetrician must always *suspect* abnormal fetus in every prolonged labour where no other cause accounts for the difficulty.

(7) The obstetrician should always be ready to administer prompt corrective measures in dystocia due to the fetus, with the view in mind to,
   (1) *save the mother*
   (2) save the child.

In the discussion to follow, the various abnormalities of the fetus shall be briefly described, with emphasis on their frequency, diagnosis and treatment. An attempt is made to stress the practical side for the benefit of the student and the general practitioner.

A. The "Normal" Big Fetus

Definition

The upper limit of the normal range of weight of the fetus at birth is given generally as nine pounds.

Occurrence

The frequency of big babies at birth, exceeding 4500 grams was given by Kaern (16) as varying between 0.31% and 2.2%. His own figure was 0.92%.

With the increase in the weight of the fetus, the length of the labour increases, the complications are more frequent and the infant mortality sharply rises (16). Kaern (16) states that the birth of a

living child weighing more than 7000 grams per vias naturalis is considered out of question, but rare instances occurred.

The largest baby born alive was that of 7.8 kg. (17.19 lbs.) (3). The head was born spontaneously but there was difficulty with the shoulders. The heaviest stillborn child on record, weighed 11.3 kg. (25 lbs.) (3) and it was followed closely by another case of 24 lbs. 2 oz. (17).

In practice the heavy child is especially common among diabetic patients. Dystocia due to overweight child is the most common example of dystocia due to the fetus as discussed here.

Etiology

The etiological factors listed by various authors are: (16, 17)

(1) Diabetes
(2) Age—more common in older
(3) Mode of life of mother—rest
(4) Large parents
(5) Successive pregnancies
(6) Erythroblastosis fetalis (29)
(7) Sex of child. Ratio of big boys to big girls is 2:1 (16).

Diagnosis

Large fetus is rarely diagnosed before birth. An excessively large abdomen suggests:

(1) overgrown child
(2) twins
(3) and/or hydramnios

In a diabetic patient one is justified to expect a large baby.

In the differential diagnosis the use of X-ray may be of value.

Prognosis

The birth of a large baby may be spontaneous and uncomplicated. In general however, there is prolonged labour with various degrees of complications:

(a) secondary inertia of the uterus
(b) lacerations of the birth passages
(c) blood loss due to (a) and (b)
(d) damage to the child especially due to oxygen lack and central nervous system injuries due to excessive moulding.

The birth of the head is usually spontaneous but dystocia due to the shoulders is rather common (13.6% of cases (16)). It is obvious that in general, the complications are more common with the rise in weight of the child; complications are more common also in elderly primipara. Big babies in a diabetic patient present additional hazards.

Treatment

The aim is to save the baby and the mother. In diabetes elective premature termination of pregnancy by Caeserian section is now generally accepted. The treatment of prolonged pregnancy varies from rupture of the membranes, to leaving the course of events to nature. The latter, with careful observation, seems to be the method of choice.

Extensive episiotomy and the use of forceps would be the method of choice in most cases. Cleidotomy, although mentioned by some authors, is rarely necessary. Gentleness is obviously essential for the sake of the baby and the birth canal. The birth of the large baby is, in general, a cause of prolonged labour, but with good care may be relatively safe both for the mother and the baby. Since the labour is prolonged the child as a rule suffers from lack of oxygen; prompt resuscitation with use of

oxygen is indicated. The practical points to keep in mind would be:

(1) Remember that the mother, the uterus, the birth passages and the child are under extra stress.

(2) Assist the delivery by intelligent methods—extensive episiotomy, forceps, very rarely Caeserian section.

(3) Arrange for correction of blood loss, uterine inertia, mother's exhaustion.

(4) Resuscitate the baby immediately.

B. The Pathologically Enlarged and/or Deformed Fetus

Dystocia due this condition has been reported in literature, but the frequency for the entire group is difficult to estimate. Murphy in 1938 found (22) that gross congenital abnormalities were present in 68 per 10,000 of deaths and stillbirth from all causes. Potter (24) showed that congenital malformations were responsible for 11.1% of infants death in Chicago, and 14.1% in New York. Probably only a small portion of these cases produced dystocia.

The difficult labour in this group of cases may be due to either general or local increase in size of the fetus. Some of the conditions are the result of defects in the development, others due to the environment. A large group of the malformed fetus may be called a "monster" which by definition, is a child born with a deformity so pronounced that it interferes with the general or local development (13). The majority of the defective fetus producing dystocia are born dead or die shortly after birth. In the discussion therefore the emphasis will be placed on the safety of the mother. Most monsters are small and do not cause difficulty during the delivery.

1. General Enlargement

A. general fetal dropsy or fetal anasarca

Occurrence

Dorland (7) collected in the literature prior to 1919, 127 cases of this condition. The condition is essentially a generalised edema of subcutaneous tissues, associated frequently with effusion of fluid into serous cavities. The head, body and extremities may be swollen to the extent of obliteration of the features. Placenta and cord are also swollen as a rule.

Etiology

Dorland (7) lists 15 cases of toxemia of pregnancy associated with the fetal anasarca and suggests that there may be a causative relationship. Kerr (17) points out that the rapid disappearance of maternal symptoms in puerperium would point to the fetus as the primary cause of the enlargement.

Diagnosis

Diagnosis prior to delivery is rarely, if ever, made.

Prognosis

According to Dorland (7) the fetal mortality is absolute. The enlargement of the fetus is responsible for prolonged labour, uterine inertia and injury to birth canal in the second stage, while the large edematous placenta complicates the third stage.

Treatment

The principle is to save the mother. Caeserian section in prolonged labour, and other measures outlined under dystocia due to "normal" big child, apply here too. Less consideration for the fetus is justified if the state is known.

B. CHONDRODYSTROPHIA FETALIS

C. ELEPHANTHIASIS CONGENITA CYSTICA

These may lead to dystocia due to the generalized enlargement of the fetus (26).

II. Local Enlargement

A. HYDROCEPHALUS

Hydrocephalus may be defined as excessive accumulation of cerbro-spinal fluid within the cranial cavity (4). The two large groups of causes are:

(1) excessive production
(2) blocked passages

The exact etiology cannot be discussed in this paper.

Occurrence

Of the local enlargements of the fetus, the hydrocephalus is the most important and the most frequent cause of dystocia. Hydrocephalus is responsible for the dystocia in about 1:1000 of deliveries (all) (17). It is the most frequent abnormality of the central nervous system being present in 31.8% alone, and in combination with spina bifida in 16.8% (22). Half of the hydrocephalic infants had other gross defects (4). The condition is more common in families with previous history of congenital malformations (4). The average maternal age was found to be 29.2 (4). Minor degrees of hydrocephalus do not cause dystocia; extreme cases may cause delivery through vagina impossible without intervention.

Diagnosis

Hydrocephalus may be suspected before birth in:

(a) a patient who had previously abnormal children
(b) where hydramnios has been diagnosed.

Actual diagnosis before birth may be difficult. The prenatal diagnosis was made in 7 cases of total 24 at the Mayo Clinic (4). In some cases the pregnant women were suspecting an abnormality of the fetus. Hydramnios, acute or chronic, is probably the most important symptom of hydrocephalus in utero. It was present in ¼ of cases (4).

Diagnosis during the labour was made in 5 cases, during delivery in 10 cases, and in the nursery in 2 cases, in a total number of 24 at the Mayo Clinic (4). In 19 cases out of 22 the diagnosis was made by abdominal or vaginal examination, or both, and in 8 cases out of 19 by X-ray prior to examination (4).

The methods in the diagnosis of Hydrocephalus are: abdominal, and vaginal examination, and X-ray.

Delee (13) suggests the following observations useful in the diagnosis:

(1) Abdominal Examination
  (a) Large uterine mass
  (b) Tense lower uterine segment
  (c) The rigidity of abdomen
  (d) The lock of engagement
(2) Vaginal—broad sutures, large fontanelles and a large flat elastic dome that seeks to enter the pelvis.
(3) Rectal—the vault of the pelvis is empty.

The use of *X-ray* has contributed in many cases to the diagnosis. No absolute reliance should be placed on single A-P view (4, 6). Flat A-P X-ray especially of the fundus may give an exaggerated conception of the size of the head.

The following have been listed as points of importance in the diagnosis of hydrocephalus by X-ray—Dippel (6).

(a) enlarged head shadow on A-P and lateral roentgenograms

(b) relatively small facial features
(c) gaping sutures and fontanelles
(d) disproportionately small body
(e) globular shape of the head.

Dippel has added two other points:

(f) absence of occipital flattening in breech presentation
(g) marked decrease in the intensity of the shadow of the vault of the skull as compared with the base of the skull.

In breech delivery the presence of other defects especially spina bifida are suspicious.

Prognosis

Hydrocephalus is the third commonest cause of uterine rupture (25). This may be quite possible in view of the obstruction which the enlarged head causes. It stands high in the list as a cause of prolonged labour. Since the diagnosis is made with difficulty, especially in breech presentations, the maternal mortality in such cases is high.

The hydrocephalic fetus had other gross abnormalities in one half of the cases; spina bifida was present in three eighths of cases (4). Almost all monsters die before, during, or after birth, and only a very small percentage survive till adult life (4).

Treatment

The aim of the treatment is to reduce the size of the head of the fetus. All consideration is given to the mother. The reduction of the size of the fetal head is usually achieved by tapping of the enlarged head and/or more extensive destruction when necessary. Extraction is necessary in difficult cases; it must be gentle and careful. In cases before term Kerr (17) advises induction of labour by rupture of membranes.

Practically all writers agree that the perforation of the fetal skull be made either at full dilatation of the cervix or when the latter is easily dilatable. There are individual preferences in the methods of choice in the perforation of the skull. In cephalic presentations simple tapping of the ventricle with No. 18 spinal needle seems to be the simplest method and is effective in most cases (13, 23). Titus recommends perforation and the craniotomy with slow extraction. Most of the other writers advise the use of various means of extraction when the natural forces fail (23, 17, 4).

In breech presentation the hydrocephalus is reduced in size by perforation of the base of the skull by various methods (4, 5). The subject of version is a matter of controversy.

Intraventricular tap and drainage are permissible in Catholic patients (23). Caesarian section is not justified as a rule, because the fetus mortality is extremely high in all cases regardless of treatment.

B. MENINGOCOELE AND ENCEPHALOCOELE

These conditions are encountered occasionally along the sutures, but especially at the fontanelles. They rarely cause trouble at birth but are held responsible for abnormalities of presentation (17).

C. ANENCEPHALUS

The monster of this type does not produce dystocia due to the deficient skull. The shoulders are frequently enlarged and difficulty at that level may arise. Abnormal presentations tend to be common complications. The diagnosis is usually made during the delivery but in cephalic presentations it may be confused with breech presentation, placenta praevia or face presentation (13). The mother again should have all the con-

sideration. Episotomy and traction in most cases are sufficient, cleidotomy, amputation of one or both arms, may be resorted to in difficult cases.

D. DYSTOCIA DUE TO LARGE SHOULDER GIRDLE AND TUMORS OF NECK AND THORAX

Large shoulders are most frequently associated with a large fetus and on anencephalus. In all cases of dystocia, where the delivered head is large and the neck is thick, shoulders are usually the cause. The difficulty may arise from the large shoulder girdle, or from the failure to rotate.

In the differential diagnosis contraction ring, and a short cord should be included.

Treatment

Where the baby is alive treat as a large baby by extensive episiotomy. Some authors (17) advise the use of a blunt hook in the axilla.

The tumors of the neck and thorax are very rare causes of obstruction, because they rarely reach large size to cause obstruction. They do however cause malpresentations, and that may occasionally complicate the labour.

Distension of fetal thorax is a great rarity and only 7 cases have been collected in literature by Winckel. This condition is, as a rule, associated with ascites. Treatment would be the same as in a case of abdominal distension.

E. ENLARGEMENT OF THE ABDOMEN

The enlargement of the abdomen may be due to the following conditions:

(a) *Fetal ascites*—Dorland collected 80 cases in literature until 1919 (7). The etiology is frequently unknown. Head presentations are common and spontaneous rupture of the fetal abdomen may occur. The cause of dystocia is discovered late.

(b) *Distension of urinary tract*

I—Bladder—Goldberger collected 217 cases of congenital dilatation of fetal bladder in 1929 (9). An interesting discussion about etiology is to be found in (15, 19, 7).

II—Congenital polycystic kidneys —Lynch (19) in 1906 gave the figure of 38 known dystocia due this condition. Dorland (7) in 1919 collected 43 cases.

(c) Cystic degeneration of the liver—Dorland in 1919 (7) listed 4 cases.

(d) Retroperitoneal tumor.

(e) Tumors of the ovary, of undescended testicle.

(f) Distension of abdominal cavity by gas produced by B. aerogenes.

The conditions listed are extremely rare. Head presentation is a rule and some difficulty in the recognition of the cause of cystocia may arise after the head has passed. Treatment is essentially perforation and drainage or partial removal of the tumor masses.

Tumors of sacrum have been known to cause dystocia in very rare cases (27). Treatment is to reduce the tumor in size by puncture or partial removal.

C. The Multiple Fetus

I. THE "NORMAL" MULTIPLE FETUS

Occurrence

Twins are encountered in the ratio of 1:90 of all deliveries. The actual dystocia, however, is rare for the following reasons:

(1) About 80% of twin pregnancies terminate before term (13). In Guttembacher's series (14) labour

occurred on the average 22.2 days before the expected date.

(2) The babies are small.

When difficulties arise they may be due to, (a) uterine inertia due to the prolonged labour produced by over-stretching of the uterine muscle, (b) mal-presentations, the latter being common due to the small size of the children and abundant amniotic fluid. (c) Locking.

The diagnosis of twins is important before delivery in order to be able to anticipate difficulties. The abdominal examination may be frequently inconclusive, except where two fetal hearts are heard at some distance apart with a difference of rate at least 10. To check this point, one fetus should be stimulated by palpatation or stroking; in these cases the fetal heart rate rises, as opposed to the absence of change in the other fetus. One must realize that the fetal heart sounds of one fetus may be heard at two separate points. Palpation of two heads distinctly and of two backs are contributory. X-rays are to be used in every suspected case—they are conclusive.

Prognosis

The fetal mortality in a multiple delivery is higher than in the delivery of one fetus (4). In cases of locking the mortality of the leading fetus was given as 86.6% in severe cases (20).

The locking of twins at the delivery is the most serious complication. When one considers that in the presentations of twins there is considerable variation: (according to Guttmacher (14),

38.7% were both vertex

40% one as vertex and the other as breech

9% both breech)

it is in a sense surprising that actual locking occurred in 90,000 of deliveries (20).

There are three types of locking: (17)

(1) locking of fore-coming and after-coming heads (20)

(2) locking of two fore-coming heads

(3) locking of after-coming head of first child with the shoulder of the second child.

Treatment

(17) The first type of locking described may be treated by pushing the second head under anaesthesia. An attempt is made to save the second child. Decapitation of the first child has been resorted to when it was found dead while the second child still was alive. For the second child forceps may be necessary. In the second type push the head out of the way. In the third type decapitation of the first child and version of the second appears to be the best choice. Although the use of caesarian section was not found described in the literature reviewed, this method of treatment might be of value in some cases.

In other types of twin delivery "intelligent expectation" would be the rule (13). Other problems should be treated similarly, to a single delivery with due consideration of the extra load on the forces and the passages as well as on the passenger. One of the most important rules to keep in mind is to think about the fate of the second baby at all times. Delee advises emptying of the uterus if there is no progress in the delivery of the second child after one hour.

II. DOUBLE MONSTERS

In general, the single monster is more dangerous due to its large size (13). The classical work on the fetal pathology and the most complete classification of mon-

strosities was done by Ballantyne at the beginning of this century (1). The practical description of these cases, with emphasis on the treatment, are to be found in the works of Delee (13) and of Kerr (17).

Delee divides the important types of double monsters into three groups with regards to their clinical significance.

(1) Those which offer an obstacle to the delivery by the increase in size of the body at either end (these are the members of the group of Dicephalus).
(2) Fusion at either end, the two having a tendency to form a straight trunk.
(3) Well formed babies which have a freedom of motion at the point of fusion.

It may be stated that, as a rule the monsters die before, during, or shortly after the birth. The cases of fusion with marked mobility may survive, as is well known in the case of Siamese twins and of the Chinese twins. Double monsters are responsible for marked dystocia in other cases of malpresentation. Placenta praevia and prolapse of umbilical cord are frequent in this condition.

Diagnosis

The diagnosis by X-ray is most reliable; it is also the most valuable diagnostic tool before delivery. During the labour palpation may give the essential information; the presence of any abnormality combined with dystocia should lead one to the suspicion of a monster.

Treatment

All consideration should be reserved for the mother especially so when the case is serious. Delee (13) advises the following: for the first type, one head after the other should be extracted by forceps when one of them becomes engaged. If not engaged, version can be performed followed by exenteration and craniotomy if necessary. In the cases of delivery of one head and the arrest of the shoulders the head may be amputated in order to gain access to the trunk. Other methods involving essentially the reduction in size by intervention are described but the damages are usually so extensive that a Caesarian Section (17) would be of greater help for the mother than the extensive "butchery" within the birth passages.

Miscellaneous

Rigor Mortis with its lack of elasticity may produce dystocia and even rupture of the uterus (13).

D. The Fetal Membranes

The fetal membranes are rarely responsible for dystocia.

THE SHORT CORD (17)

A cord shorter than 20 cm. usually gives rise to more or less marked dystocia. The shortest cord reported was 10 cm. (17). The difficulty arises especially in breech presentation with the child "riding" the cord. Short cords may produce delay in delivery rupture of the cord with blood loss of the baby, prematures separation of the placenta, and even inversion of the uterus.

Treatment

Cut it as soon as possible when diagnosis is made.

Abnormalities of Placenta do not produce dystocia.

Tough membranes (13) may occasionally be the cause of obstruction during the labour due to their adherence over the lower segment of uterus with

inadequate dilatation of cervix, or the membranes may be so tough that they do not rupture even when the cervix is completely dilated. Pushing up the head and rupturing the membranes is usually followed by normal delivery.

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Moore, R. F.	St. Michael's Hospital, Toronto
Moran, F. J.	Toronto East General Hospital, Toronto
Murray, J. K. C.	Toronto General Hospital, Toronto
Mustard, J. F.	Toronto General Hospital, Toronto
Mustard, K. I.	Toronto General Hospital, Toronto

Noonan, W. E.	Hamilton General Hospital, Hamilton, Ontario
Otue, N.	Sisters of Charity Hospital, Buffalo, N.Y.
Page, W. E.	Hamilton General Hospital, Hamilton, Ontario
Parrish, R. M.	Mount Carmel Mercy Hospital, Detroit, Mich.
Pascoe, J. H.	St. Michael's Hospital, Toronto
Pasternak, L.	Buffalo General Hospital, Buffalo, N.Y.
Peterson, J.	Toronto Western Hospital, Toronto
Petrasek, A.	St. Michael's Hospital, Toronto
Pidgeon, T. V.	Kitchener-Waterloo Hospital, Kitchener, Ontario
Preston, A. J.	Toronto General Hospital, Toronto
Proud, R. F.	Hamilton General Hospital, Hamilton, Ontario
Quan, P.	St. Joseph's Hospital, Hamilton, Ontario
Ranney, E. K.	Toronto General Hospital, Toronto
Rawlinson, W. S.	Toronto General Hospital, Toronto
Redford, J. W. B.	St. Paul's Hospital, Vancouver, B.C.
Reid, R. P.	Deaconess Hospital, Spokane, Washington
Rhodes, R. C.	Vancouver General Hospital, Vancouver, B.C.
Richmond, H. A.	Toronto General Hospital, Toronto
Rogers, D.	Sisters of Charity Hospital, Buffalo, N.Y.
Roth, E. M.	Jewish General Hospital, Montreal, P.Q.
Ruderman, R. L.	Mount Sinai Hospital, Toronto
Rudnai, S.	Address unknown
Sada, Miss M.	Vancouver General Hospital, Vancouver, B.C.
Sarjeant, D. A.	Toronto General Hospital, Toronto
Schatz, S. W.	Toronto General Hospital, Toronto
Scott, A. A.	St. Michael's Hospital, Toronto
Segal, S. H.	Central Dispensary & Emergency Hospital, Washington, D.C.
Senn, J. S.	Hamilton General Hospital, Hamilton, Ontario
Sereda, L. E.	St. Michael's Hospital, Toronto
Shaw, G.	Toronto Western Hospital, Toronto
Shepherd, R. W.	Toronto Western Hospital, Toronto
Sheppard, T. J.	Toronto General Hospital, Toronto
Sheppard, Miss E. B.	Toronto Western Hospital, Toronto
Simurda, M. A.	Toronto General Hospital, Toronto
Sisson, B. V.	St. Michael's Hospital, Toronto
Spilsbury, B. W.	Victoria General Hospital, Halifax, N.S.
Sproul, R. F.	Detroit Receiving Hospital, Detroit, Mich.
Stancer, S. L.	King's County Hospital, Brooklyn, N.Y.
Stasior, O. G.	St. Vincent's Hospital, New York, N.Y.
Stein, H. A.	Mount Sinai Hospital, Toronto
Steiner, L.	Royal Columbian Hospital, New Westminster, B.C.
Stern, I.	Mount Sinai Hospital, Toronto
Sullivan, J. B.	Toronto General Hospital, Toronto
Sullivan, W. E.	St. Michael's Hospital, Toronto
Sutton, M. R.	St. Michael's Hospital, Toronto
Tanz, E. M.	Toronto General Hospital, Toronto
Toews, R. R.	Toronto General Hospital, Toronto
Trupp, H. C.	Oshawa General Hospital, Oshawa, Ontario
Turton, M. R.	Kingston General Hospital, Kingston, Ontario
Urback, P. G.	Toronto General Hospital, Toronto
Varga, G.	Toronto Western Hospital, Toronto
Varley, J. C.	St. Paul's Hospital, Vancouver, B.C.

Wagman, G. F.	Mount Sinai Hospital, Cleveland, Ohio
Wasserman, M.	Michael Reese Hospital, Chicago, Ill.
Wasylenki, M.	Cleveland City Hospital, Cleveland, Ohio
Watt, H. J.	Toronto General Hospital, Toronto
Watters, R.	Royal Jubilee Hospital, Victoria, B.C.
Wedderspoon, D. K.	Royal Victoria Hospital, Montreal, Quebec
Wensley, J. A.	Toronto Western Hospital, Toronto
Wiener, J.	Detroit Receiving Hospital, Detroit, Mich.
Wigderson, A.	King's County Hospital, Brooklyn, N.Y.
Wigle, E. D.	Toronto General Hospital, Toronto
Wizenberg, M. J.	Mount Sinai Hospital, Baltimore, Md.
Wood, R. W.	Toronto General Hospital, Toronto
Wright, J. C.	Royal Columbian Hospital, New Westminster, B.C..
Yancoff, V. Y.	Toronto East General Hospital, Toronto
Youngs, J. A.	Mount Carmel Mercy Hospital, Detroit, Mich.

SPECIAL INTERNESHIP

Arrangements are now being made for special interneships designed to prepare doctors for general practice. The appointments begin July 1st, 1954.

The program includes four months in Paediatrics, four months in Obstetrics and Gynaecology, and four months in Medicine.

These interneships are open to doctors who have completed at least one year on a rotation interneship.

Further information may be obtained from Dr. P. C. Dickson, Wellesley Hospital, Homewood Place, Toronto 5. Application should be made to Dr. Dickson *before* October 15, 1953.

J. A. MacFarlane,
Dean.

Only the man who is familiar with the art and science of the past is competent to aid in its progress in the future.—Billroth.

ABSTRACTS

MEDICINE

The Excretion of 17-Ketosteroids; Values in Several Endocrine Disturbances: Samuel Kenigsberg and Thomas H. McGavack; Journal of Clinical Endocrinology and Metabolism; Vol. 12, Dec. 1952. 1551-1561.

The values for the urinary excretion of 17-ketosteroids in 24 hour volumes of urine from each of a series of patients suffering from endocrine disorders were determined. A relatively simple laboratory method is available for the estimation of 17-ketosteroids in urine, and normal values in relation to age and sex have been recorded. 17-ketosteroids are mostly if not all metabolites of androgenic hormones elaborated by the adrenal cortex and gonad. Their daily excretion in the urine may reflect the functional status of the adrenal cortex. High values suggest hyperfunction and low values suggest hypofunction.

Results were expressed as the excretion of 17-ketosteroids in milligram equivalents of dehydroisoandrosterone.

The following results were obtained:
(1) Marked depression of excretion of 17-ketosteroids in myxedema. This tended to increase during treatment with thyroid hormone in amounts depending upon the age of the patient. However in cases of hypothyroidism without myxedema excretion of 17-ketosteroids was in or slightly above normal range.
(2) In hyperthyroidism values were generally on the low side of normal, with no correlation between these values and the clinical degree of toxicity.
(3) Cases of Cushing's syndrome due to primary adrenal hyperplasia were found to have a daily excretion well above normal. Low values were found in subjects with benign tumor and extremely high values in subjects with a malignant tumor of the adrenal cortex.
(4) No constant change was found in a large number of cases of male hypogonadism. This was taken as an indication of the lack of value of the determination of 17-ketosteroids in the diagnosis of male climacterium. 17-ketosteroid excretion in castrates and individuals with complete bilateral atrophy of the testes was in the normal range for women.
(5) Values were depressed in advanced cirrhosis of the liver; extremely low in panhypopituitarism; excessively high in subject with an arrhenoblastoma of ovary.

R. J. Watson

Rehabilitation of the Patient with Hemiplegia: Covalt, D. A., Annals of Int. Med., 37, No. 5, Nov. 1952.

Patients with hemiplegia comprise the largest group of chronic neurologic defects present in this country at any one time, and hence an active program is necessary for their further care and rehabilitation, after treatment of the acute condition. With proper care almost 80% are capable of self-care.

The author reviews his results with 200 cases looked after and recommends several procedures:

A. Selection of Hemiplegics for Active Rehabilitation—Cases excluded are those with malignant hypertension, encephalomalacia and senility. Each patient must have the will power to start and carry on his treatment. If hemiplegia is due to thrombosis or embolism, an active program is started in 2-3 days; if due to haemorrhage in 5-7 days.

B. Initial Examinations—a physical and mental survey. The 3 tests that are most important are range of motion test, muscle test, and testing for activities of daily living (102 ordinary activities include speech, feeding, toilet care, etc.).

C. Procedures to Prevent Deformities While in Bed in the Acute Phase and Later—prevent adduction contracture of upper extremities, prevent foot drop, prevent outward rotation of the leg, do a

complete range of motion passively twice daily of all joints, and do quadriceps muscle setting for 15 minutes twice a day.

D. Treatment Program—learn to sit upright in bed at first with assistance. This is important because it preserves the sense of balance. Learn to stand by the side of the bed with the aid of parallel bars. Learn to walk after a few days of sitting and standing, and this is done with a reciprocal motion, i.e. when the right hand is extended along the parallel bar the left leg is put forward. After learning to walk on level stretches, the patient is taught to climb stairs. If foot drop is present, a short leg brace is used. Speech therapy is given to aphasic patients. With the aid of a physical therapist, personal care activities are taught the hemiplegics.

This short but highly informative article is well worth reading by all medical students.

M. Wasylenki

Life Stress, Emotions and Painful Stiff Shoulder: Lorenz, T. H. and Musser, M. J., Annals of Int. Med., Vol. 37, No. 6, Dec. 1952.

The common complaint of pain and stiffness in the shoulder joint presents a complex diagnostic problem, and often the most complete examination will fail to reveal a cause. Chronic wear and tear are often considered a major cause, but even here the etiology is frequently obscure.

The authors were impressed by the fact that 20% of 300 patients seen in psychomatic consultation complained of this syndrome. All these patients had other psychosomatic complaints such as "headache", "nervousness", "stomach trouble", "heart trouble" and muscular discomfort. All were tense and had signs of general hypertonus of muscles with evidences of autonomic instability. There was tenderness to palpation around the joint and in adjacent muscles, limitation of movement, and a tendency to "protect" the affected shoulder. X-ray and laboratory findings were almost non-contributory.

The onset of symptoms almost without exception occurred when these patients were subjected to an emotionally stressful situation. They had remarkably similar personalities: the majority were aggressive, over-conscientious and energetic but with underlying insecurity reflected in excessive worry and tension. They were very dependent on emotional support from others, easily annoyed and frustrated, and many had deep-seated resentments—carrying a "chip on the shoulder". Illustrative case summaries are presented in the article.

The authors stress the significance of emotional factors in this syndrome, particularly in "obscure etiology" cases and even in cases where there is organic disease, such as aberrent calcification. The shoulder joint is a poorly suited structure for the demands placed upon it. They suggest that the sustained muscular tension in the shoulders of these emotionally torn patients superimposed on the trivial trauma of daily use is sufficient to produce injury and resulting symptoms. They advocate that psychotherapy be added to orthopedic and medical measures ordinarily used in treatment of the stiff painful shoulder. So far their results have been encouraging.

J. B. Redford

Epidemic Pleurodynia in Texas—A Study of 22 Cases: Heubner, Risser et al, New Eng. Jour. of Med., 248: No. 7, Feb. 12, 1953.

Epidemic pleurodynia (Bornholm disease, epidemic myalgia, "Devil's grip") was first described by Daae and Homann in Norway in 1872. Until recently, attempts to isolate the etiological agent were unsuccessful. An opportunity to carry out such studies was provided in the summer of 1951 when an outbreak occured in northeastern Texas.

With the possible exception of 5 patients with an equivocal diagnosis, the 22 patients all had an acute onset of fever, headache and anorexia, accompanied by severe paroxysmal abdominal or chest pain aggravated by respiration. Recovery was often interrupted by recurrence of pain and fever, and the total duration of illness varied from 1 to 2 days. Sequelae were uncommon but a painful and persistent orchitis occured in some.

Fecal specimens were sent to the Bethsada laboratories, antibiotics were added to eliminate bacterial comtaminants and the suspension was injected into one day old mice. Viruses established in subsequent passages were identified immunologically: 18 of the 22 stools were identified as the Coxsackie virus. This was first typed as Dalldoil's group A—type 1 (the etiological agent of poliomyelitis). However, further observations revealed that it was not this virus but another agent lethal for suckling mice that was present in 16 of the stools. This is known as Dalldoil's B3 virus.

The recovery of the Coxsackie virus B3 from the stools of these patients provides a sound basis for the hypothesis that this virus represents the etiological agent responsible for epidemic pleurodynia.

G. Fyffe

SURGERY

Hemigastrectomy Combined with Resection of the Vagus Nerves: D. A. Farmer, M.D., and R. H. Smithwick, M.D., New England Journal of Medicine, Vol. 247, No. 26, Dec. 25, 1952, pp. 1017–22.

Two relatively rare causes of dissatisfaction with current subtotal gastrectomy for duodenal ulcers are:

1. Development of gastrojejunal ulceration in 2-5%.
2. Post-operative sequelae of intolerance of certain foods, dumping syndrome, need for frequent small meals, difficulty in maintaining weight, inability to perform hard labor, etc.

To date, both the physiological and clinical results in a small series of cases subjected to hemigastrectomy and vagotomy have been more uniformly satisfactory than those of any other procedure tried including subtotal gastrectomy.

Under fasting conditions, gastric contents were aspirated for an hour, and for another hour after the introduction of peptone beef broth for chemical stimulation or insulin for neurogenic stimulation. Average figures for gastric acidity in patients with stomal ulcer were only slightly lower than those for duodenal ulcer without operation. Operations had somehow failed to modify the acid-peptic factor sufficiently to protect patients against recurrent ulceration. Findings suggest that total achlorhydria is necessary to ensure protection against stomal ulcers.

The authors find that total achlorhydria was obtained in a greater percentage of patients following hemigastrectomy and vagotomy, than following any other operation including subtotal gastrectomy, with and without vagotomy. Clinical results on a basis of absence of the unpleasant post-operative sequelae mentioned above, and general satisfaction of the patient showed a greater percentage of patients getting results approaching perfection following hemigastrectomy and vagotomy than any other procedure after one to five years.

The series is admittedly small but it tends to support the suggestion that the extent of gastrectomy has a distinct bearing on the incidence of post-operative side effects. It would seem that the larger the gastric remnant, the more satisfactory the results.

G. G. Dale

NEWS AND NOTES

Faculty

The annual Banting Memorial Lecture was given by Professor E. D. Adrian of Cambridge University, on September 16th.

* * *

The Donald C. Balfour Lecture was given on Thursday, October 15th, at 5 o'clock, in Osler Hall, Academy of Medicine. The lecturer was Charles Frederick William Illingworth, C.B.E., F.R.C.S., Regius Professor of Surgery, University of Glasgow.

* * *

The Phi Delta Epsilon Lecture will be given on November 16th by Dr. Burrill B. Crohn of Mount Sinai Hospital, New York.

* * *

Dean MacFarlane, President of the Association of Canadian Medical Colleges, will attend the annual meeting of the Association in Montreal. He will also attend the meetings of the Association of American Medical Colleges in Atlantic City.

* * *

Professor R. F. Farquharson and Professor R. E. Haist will attend the Institute of Teaching in Physiology, Biochemistry and Pharmacology sponsored by the Association of American Medical Colleges.

* * *

The Kellogg Foundation has made a grant of $15,000 to the Faculty of Medicine over the next three years, for the support of decentralized postgraduate medical education.

* * *

The new Charles H. Best Institute, at the University of Toronto, was officially opened on September 15th, when Sir Henry Dale, Nobel laureate and Chairman of the Scientific Advisory Committee to the British Government, turned a golden key in the door of the new building.

The Institute will house the teaching facilities for the Department of Physiology, and will provide greatly increased research facilities for this Department and for the associated Banting and Best Department of Medical Research.

At a special convocation held prior to the opening, the University presented honorary degrees to Dr. Detlev W. Bronk, the new Director of the Rockefeller Institute for Medical Research; to Dr. B. A. Houssay, another Nobel laureate, of Argentina; to Dr. E. P. Joslin of Boston; to Dr. W. G. Penfield of Montreal, and to Sir Lionel Whitby, the Vice-Chancellor of the University of Cambridge. Convocation addresses were given by Sir Henry Dale and by Sir Lionel Whitby.

The first scientific sessions in the new Institute were held on September 16th, when the various speakers included Dr. Joseph Hoet of Louvain, Professor E. D. Adrian of the University of Cambridge, Dr. Bronk, Sir Henry Dale, Dr. Houssay, Dr. Joslin, Dr. Penfield, Sir Lionel Whitby, and Dr. Robin Lawrence of London.

* * *

Medical Society

As a result of elections held recently, the following will hold office in the Medical Society for the year: The new Treasurer of the Society is Sandy MacPherson of Meds 5T6; the President of Meds 5T7 is John Morphet, and the President of the freshman year, Meds 5T9, is Bill Davison.

* * *

The Students' Lounge in the Toronto General Hospital underwent a renovation

this summer. Much to the satisfaction of the students and our good friend Jack Martin, the lunch counter has been moved to a more efficient location in the opposite corner of the room away from the main doorway. The floor has been painted, new curtains have been added, and a new clock installed. To add to this, the Hospital has kindly donated seven well-finished committee room tables with chairs. Congratulations are most certainly due to all those who helped in this venture; particularly to the members of the Medical Common-room Committee and its chairman, Tom McCulloch of Meds 5T5.

* * *

The Osler Society held its first meeting of the year on October 1st, at the home of the President, John Gibson of Meds 5T4. Margaret McCurdy, Meds 5T4, spoke on "Newman: Idea of a University" and John Gibson gave a paper on "Paracelsus".

J. Goodwin.

Truth comes more readily from error than confusion.—Anon.

Experience is fallacious and judgment difficult.—Hippocrates.

Camsi Art Salon, sponsored by Horner Co., Godfrey Lister.

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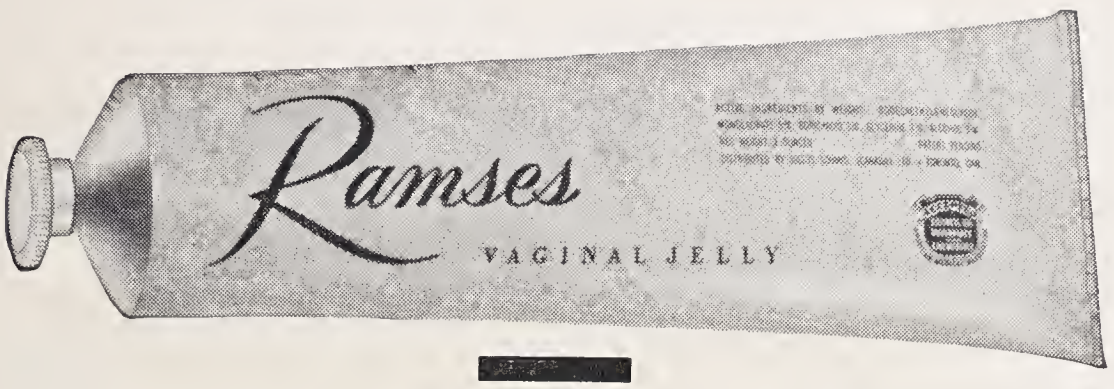

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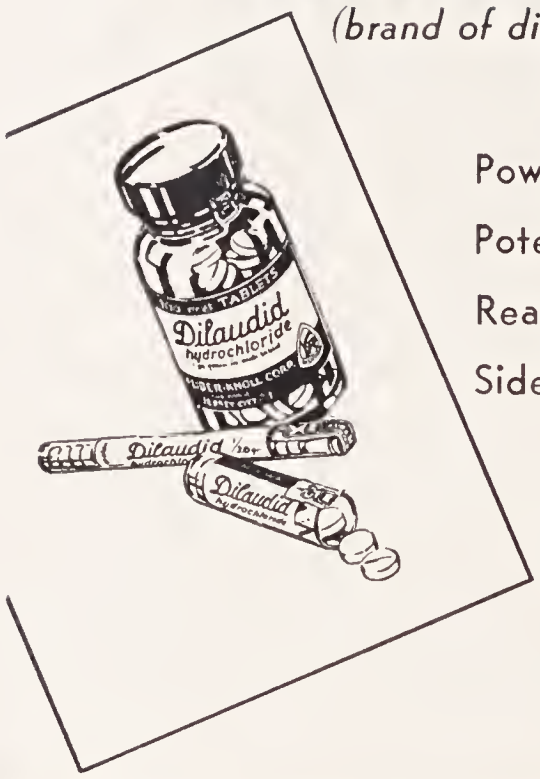

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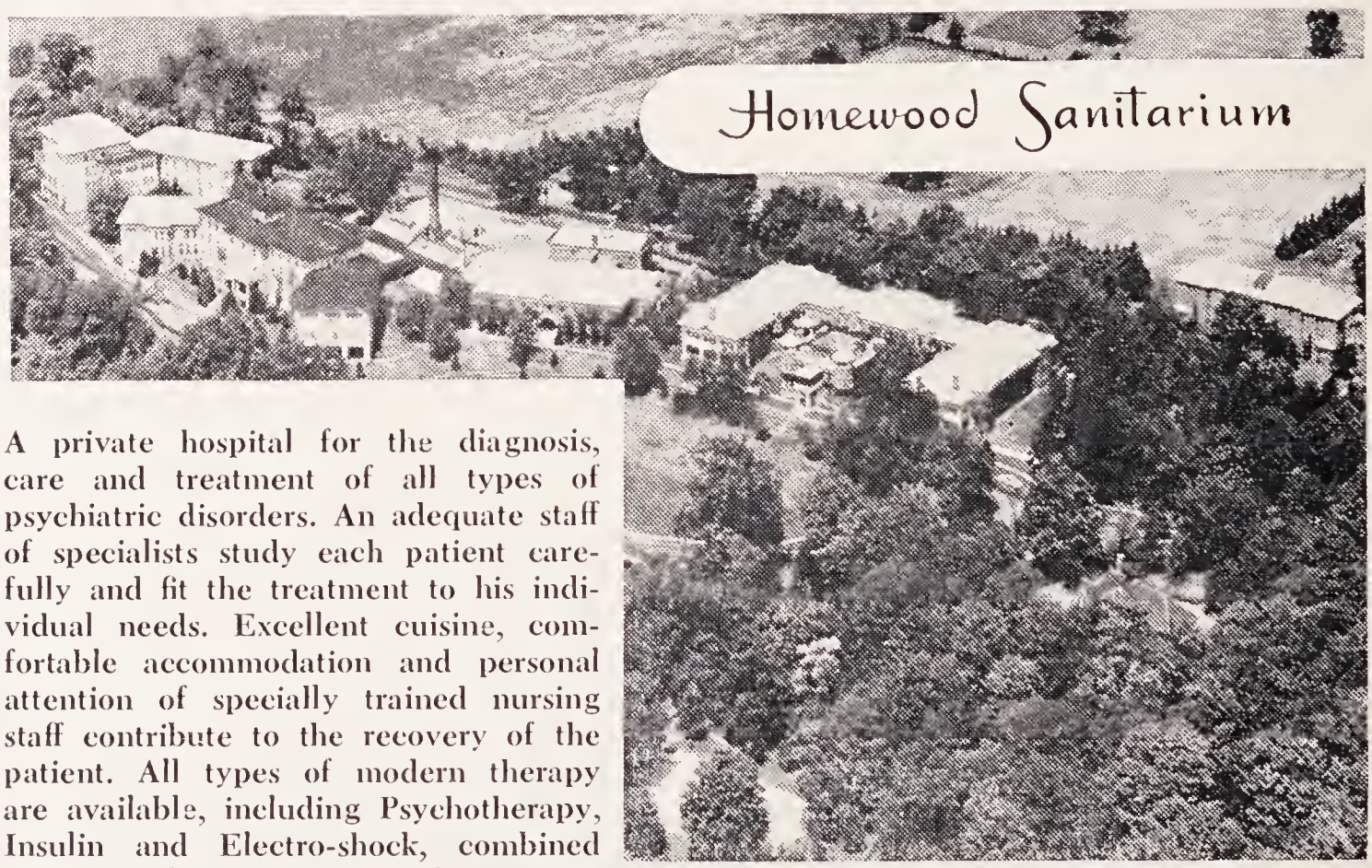

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* 1. Dickinson, R. L.: Techniques of Conception Control, ed. 3, Baltimore, Williams & Wilkins Company, 1950, p.21. 2. Report to Council on Pharmacy and Chemistry, A.M.A.: J.A.M.A. 148: 50, Jan. 5, 1952. 3. Weisman, A. I.: Spermatozoa and Sterility, New York, Paul B. Hoeber, Inc., 1941, p.257.

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McSorley, B.M.J., 1;1220 (May) 1953

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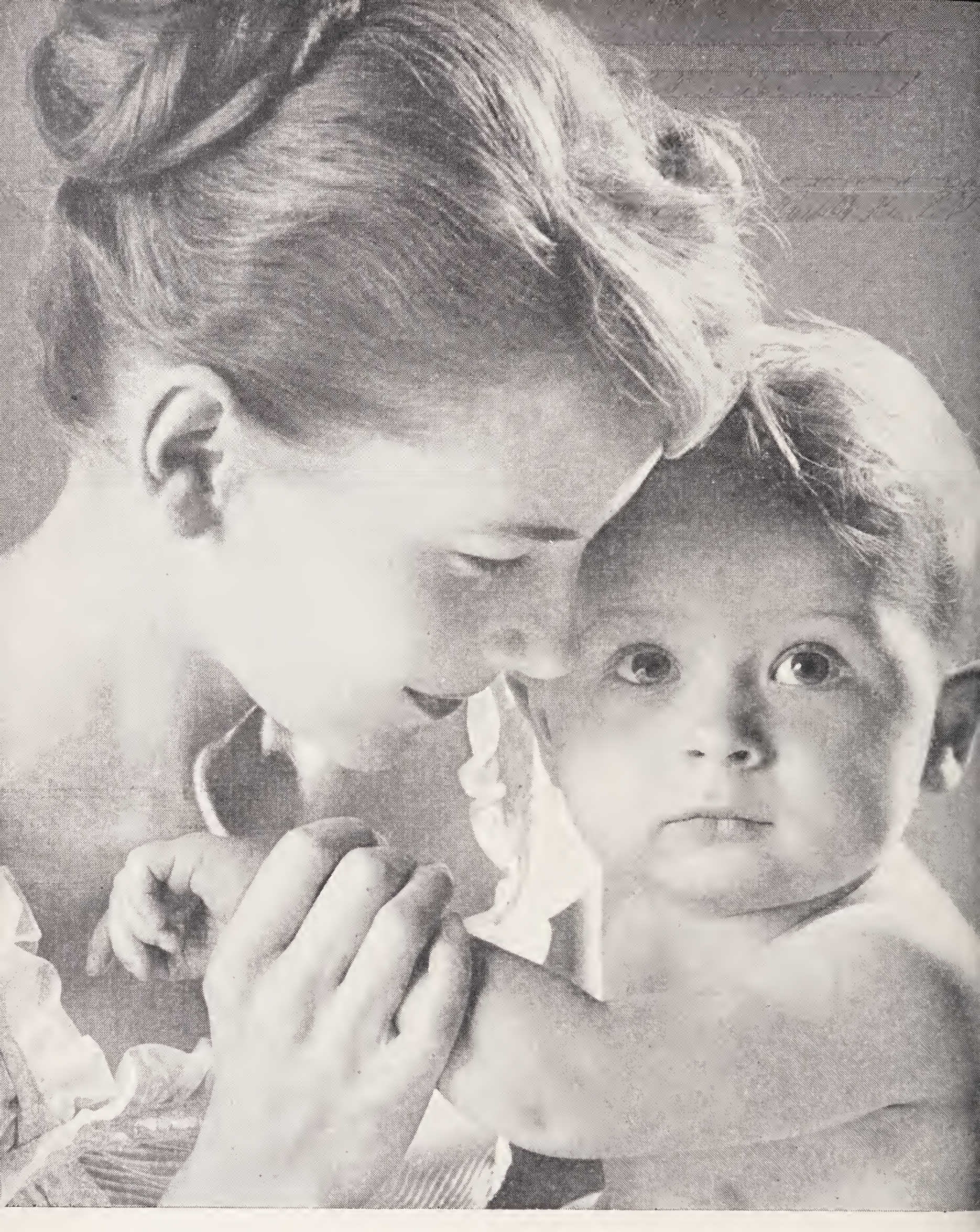

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